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ABSTRACT

This report describes activities serving the deaf population carried on by the Gallaudet Research Institute and the Office of Sponsored Programs. Introductory comments note the establishment of two new research units, the tenth anniversary of the institute, and administrative changes. The main text describes the following major institute components (the number of activities reported for each follow the component name where relevant): Center for Assessment and Demographic Studies (14); Culture and Communications Studies Program (3); Center for Studies in Education and Human Development (11); Technology Assessment Program (5); Center for Auditory and Speech Sciences (3); Genetic Services Center (3); Mental Health Research Program (7); the Scientific Communications Program; and Visiting Scholars. The concluding section consists of a report on the Office of Sponsored Programs noting the number and dollar amounts of sponsored projects. The grants and contracts awarded during the year are briefly listed by principal investigator. Information is also provided on grants and contracts awarded by Gallaudet unit/department as well as preliminary and final proposals submitted during the academic year. Appendixes contain lists of 1987-88 publications (about 110); presentations (about 120) of institute personnel; and institute personnel and affiliated researchers. Numerous black and white photographs illustrate the text. (DB)

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# A Tradition of Discovery

*The 1987-88 Annual Report of the Gallaudet Research Institute*

*including the Sponsored Programs Report*

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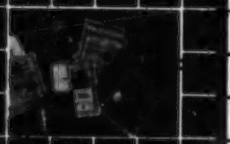

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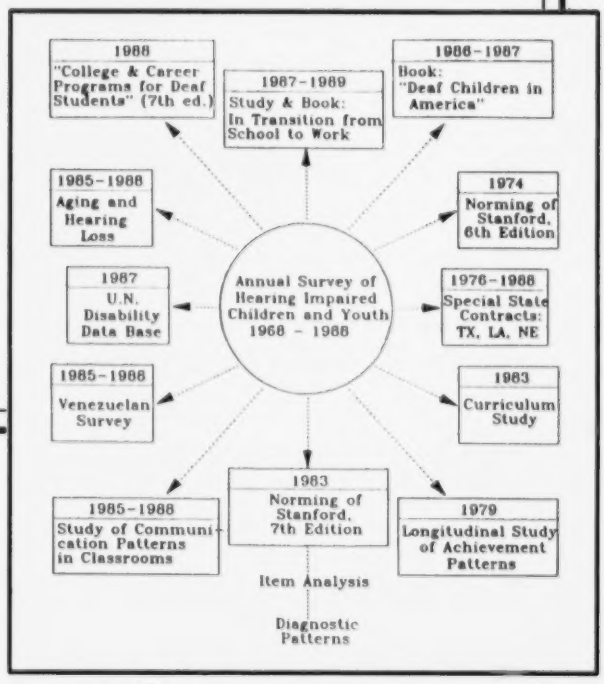
## Anniversary Report

# The Twentieth Anniversary of the Annual Survey of Hearing Impaired Children and Youth

This project, conducted by the Gallaudet Research Institute's Center for Assessment and Demographic Studies (CADS), completed its first twenty years of operation and entered its third decade in May 1988. For twenty years, this nationally and internationally recognized program has been and remains the leading source of factual information on the status and achievements of hearing impaired children and youth in the United States. Through the consulting work of its staff over the years, it has also had various offspring in other countries, from Canada to Israel to Australia to Venezuela. Hardly a project or publication in the field of education of deaf persons appears without one or, more likely, a list of citations of the definitive work produced by this group.

The roots of this program go back to recommendations from the 1964 "Conference on the Collection of Statistics of Severe Hearing Impairments and Deafness," which was convened by the National Institutes of Health at its Bethesda, Maryland headquarters. The work was initiated on a pilot basis in 1966, with grant funds from the then newly established Bureau of Education for the Handicapped (BEH). The success of the pilot led to the establishment of the national program in May of 1968, with joint funding from Gallaudet College and BEH. The BEH funding was gradually phased out, and the program has been completely supported by Gallaudet funds since July, 1974.

The success of the program is a tribute to the CADS staff for their professional knowledge, skills, and dedication, and to Gallaudet College/University for its long-standing and very substantial financial and administrative support. Most of all, however, its success is a tribute to all of you who have supported the program over these two decades through cooperation in the massive data collection efforts, and through continuous use of the findings and reports from the project.



# A Tradition of Discovery

## *The 1987/88 Annual Report of the Gallaudet Research Institute*

*including the Sponsored Programs Report*

A Publication of Graduate Studies and Research,
Gallaudet University, Washington, D.C.

*Edited by*
*Robert C. Johnson,*
*Dorothy L.Smith,*
*and Shawn Davies*

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*Persons interested in obtaining copies of this report or of the Gallaudet Research Institute newsletter, Research at Gallaudet, may write to:*

Scientific Communications Program
Gallaudet Research Institute
800 Florida Avenue, N.E.
Washington, DC 20002

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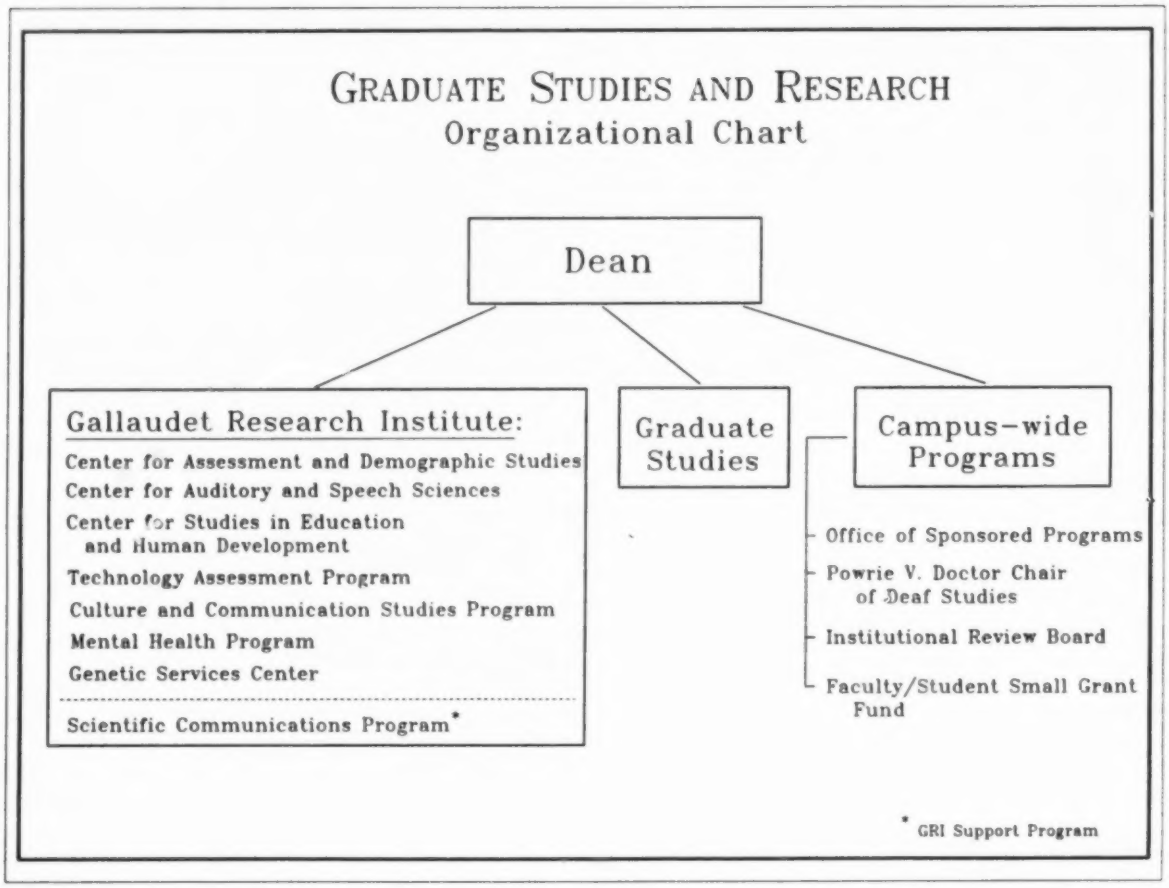
# A Year of Growth and Transition

Welcome to *A Tradition of Discovery*, the annual report of the Gallaudet Research Institute!

The 1987/88 Academic Year was a significant one in the life of the Gallaudet Research Institute. Certainly it was a year of progress and productivity for Gallaudet's Research community. It was a year of new growth, with three new units being created. The 1987/88 Academic Year was also a year of transition as we welcomed a new administration for the University. And we celebrated two important anniversaries.

*A Year of Growth*

This year two new research units came into being: the Culture and Communication Studies Program and the Mental Health Research Program. Created early in 1988, both represent new recognition for areas of research that have grown up within existing GRI units. The Scientific Communications Program, the unit that produced this report, was created to ensure that the results of research become available to a broad audience. The GRI now comprises seven research units, plus the Scientific Communications Program. Each unit and its 1987/88 projects is described in this report.



This report also documents dramatic growth in the amount of external grant support for the University. The 1987-88 Academic Year saw more that $3.4 million dollars of extramural grant and contract support for programs across the campus; this represents an increase of over 40% over the 1986/87 Academic Year. The dollar amount of GRI awards represented 42% of that campus total, with a total of more than $1.4 million dollars in externally-won grant and contract support from a variety of prestigious sources. The campus community is to be commended for these achievements, which make possible important programs and projects that Gallaudet might not otherwise be able to carry out. I especially want to congratulate the personnel of the Office of Sponsored Programs for leading this campus-wide effort.

*Two Anniversaries*

This summer marked the tenth anniversary of the establishment of the Gallaudet Research Institute. The creation in July, 1978, of the GRI represented a new commitment by Gallaudet to better integration and direction of its research on deafness; it also was one of the major steps leading to University status for Gallaudet. Since 1978, the GRI's programs have grown in number and size, as well as in quality, sophistication, and impact. The GRI now boasts the largest assemblage in the world of research investigators and support staff working on issues concerning deafness and deaf people. The GRI was founded on the proposition that none of the major research problems of deafness is susceptible to short-term solutions. It remains committed to a highly interdisciplinary and collaborative research environment.

*Faculty and staff of the GRI's Center for Assessment and Demographic Studies, some of whom have worked on the Annual Survey for most of its twenty years: From left to right, (top row) Brenda W. Rawlings, Russell E. Perkins, Sue A. Hotto, Scott Campbell Brown, David R. Hotchkiss, Hank Young; (middle row) Kay H. Lam, Kevin J. Cole, Carol A. Bloomquist, Thomas E. Allen, Director, John K.C. Woo; (bottom row) Peck Voon Choo, Mary Carole Starke, Linda L. Fields, Judith A. Holt. Missing from picture: Dorothea Bateman, Alexander Quaynor, Gail F. Ries, Arthur N. Schildroth.*

The collaborative research approach perhaps is best exemplified by the GRI's Annual Survey of Hearing Impaired Children and Youth, which completed 20 years of national data gathering and dissemination during the 1987-88 Academic Year. The success of this project, which is a national resource for our field, is due to the dedicated collaboration of the staff in the Center for Assessment Demographic Studies with personnel in schools throughout the United States. (See inside cover for more about the Annual Survey.)

*A Year of Transition*

This past year we said *au revoir* to our colleague Dr. Raymond J. Trybus. As the GRI's founder and first Dean, Ray Trybus's leadership was instrumental in making the GRI the unique resource that it is today. As of August 1st, Dr. Trybus assumed new duties as Associate Provost of the San Diego campus of the California School of Professional Psychology. Ray's many friends wish him well as he takes on new professional challenges.

The most significant personnel change affecting the Gallaudet Research Institute was, of course, the selection of Dr. I. King Jordan to be Gallaudet's eighth president. Dr. Jordan has long been counted among Gallaudet's research community. As a faculty member and administrator he maintained an active research agenda. Since becoming President of the University, Dr. Jordan has stated his support for excellence in research at Gallaudet.

On April 1st, President Jordan asked me to serve as Interim Dean of Graduate Studies and Research. The time since then has been exciting and challenging for me. In the spring and summer, I worked together with the GRI Research Directors to assess where we were, to develop procedures to make our groups more effective, and to make plans for the future. The 1988-89 Academic Year is sure to be challenging for all of us in the GRI.

*This Annual Report: Some Background*

An annual report has been prepared and submitted to the Gallaudet Board of Trustees each year since the inception of the GRI. The original intent of the report was to inform the Board about the progress of the major projects conducted by researchers of the GRI. Over the past decade, the GRI's Annual Report has become much more. This year's Annual Report indeed summarizes on individual projects, but it also seeks to put the projects and the people who conduct them in a more global context. We hope that we have been successful in presenting an accurate picture of the people and activities that comprise the GRI. This Annual Report is being published with the hope that it will lead to informed dialogue about research on deafness and deaf people. We sincerely solicit your reactions.

Finally, this document also includes the annual report of the Office of Sponsored Programs, a component of Graduate Studies and Research. Behind the facts and figures of the OSP report is an exciting reality of important campus projects and programs made possible, in part, by extramural funding.

Michael A. Karchmer

Michael A. Karchmer, Interim Dean
Graduate Studies and Research

# *Highlights. . .*

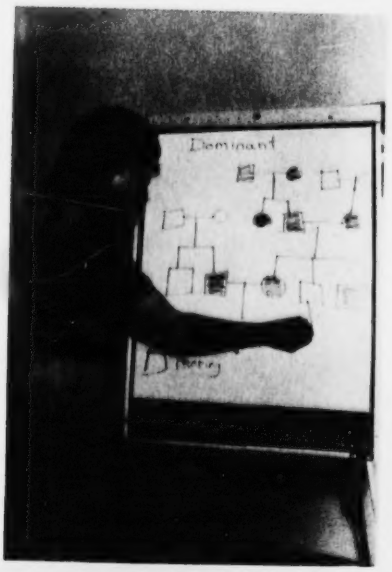
## 1987/88 GRI Events

The Gallaudet Research Institute serves as a major force in bringing together individuals from around the campus and around the world to discuss findings of deafness-related research and issues concerning future directions for research. Here are some photo highlights of just a few of last year's memorable moments.

*As part of a study conducted by the GRI's Culture and Communication Studies Program, Spanish educators visited schools in the Washington metropolitan area and participated in a forum of presentations with Gallaudet researchers and educators on "mainstreaming" in U.S. and Spanish schools. Pictured above are some of the Spanish visitors with President Jordan in the President's residence. Later in the year the U.S. delegation visited Spain.*

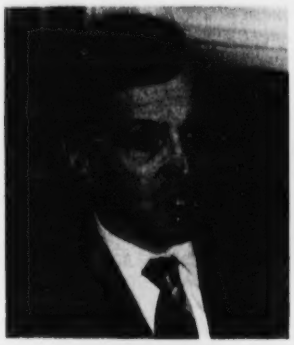
*On November 7 and 8, 1987, the GRI's Center for Assessment and Demographic Studies and the United Nations Statistical Office on Disability co-sponsored an international conference/workshop called "Global Advances in the Demography of Disability." Mary Chamie (above) of the U.N. moderated the conference and led many stimulating discussions about the potential uses of the recently-developed United Nations' International Data Base on Disability. Henry Enns of Winnipeg, Canada, and David Robinson, Geneva, Switzerland (below) participated in a panel on the experience of disablement.*

*(Above) Soviet educators from the Institute of Defectology visited Gallaudet in January. As part of the U.S. team in a U.S./U.S.S.R. International Research Exchange of Scholars, Donald F. Moores of the GRI's Center for Studies in Education and Human Development hosted the Soviet's visit to Gallaudet and will travel to Moscow for further meetings in September 1988.*



*The year 1988 was an important one for outreach and training efforts in the GRI. Through funds from a Gallaudet Presidential Award, the GRI's Genetic Services Center tripled its training efforts, presenting 19 seminars in 10 states around the United States. Shown at left is Center Director, Kathy Shaver Arnos explaining the genetic cause of one type of hearing loss. Samuel B. Trychin, GRI affiliate in Gallaudet's Department of Psychology, (far left) presents one of an extensive series of workshops on coping strategies for hard of hearing people and their hearing family members.*

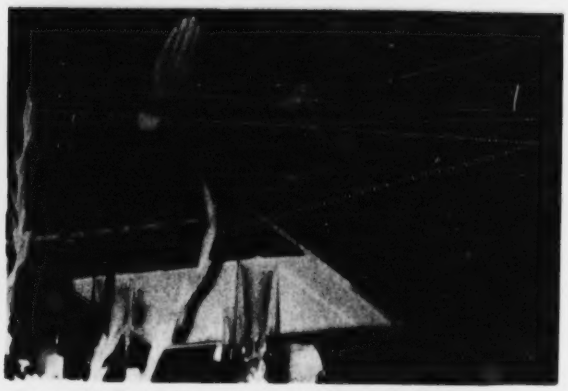
*Pictured above are some of the distinguished guests who attended Grants Recognition Day, a campus-wide event honoring individuals who acquired extramural funding for the University. From left to right, Robert Davila, Vice President for Pre-College Programs; James Barnes, former Vice President for Administration and Business; Lou Markwith, Vice President for University Relations; I. King Jordan, then Dean of the College of Arts and Sciences, now President of Gallaudet University. The ceremony included awarding of certificates to grant recipients as well as displays of posters about the grants on the walls of Chapel Hall.*



*In spring of 1988 the GRI hosted a series of four lectures and five "lunchtime conversations" with Dr. Harlan Lane (upper right), renowned author of When the Mind Hears and the 1988 Powrie V. Doctor Chair of Deaf Studies. His standing-room-only lectures were often controversial and sparked a great deal of interest on campus and locally. The GRI also invited Dr. Lane to moderate a roundtable discussion on issues related to "mainstreaming." Dr. Palle Vestberg (lower right), the GRI's 1987-88 Distinguished International Visiting Scholar from Copenhagen, Denmark, was also involved in many areas of campus activity and gave a luncheon presentation on his year-long investigation into personality development in deaf infants.*

*The GRI hosted numerous seminars and guest lectures throughout the year. Among the speakers were Sam Supalla of the University of Illinois; Julius Goldstein of Johns Hopkins University; Laurel Glass, Holly Elliott and others from the University of San Francisco Center on Deafness, to name a few. Pictured above are Richard Foulds (left) of the Alfred I. duPont Institute discussing problems associated with the transmission of images through telephone systems at the May 26-27 conference, "Toward a Videophone for the Deaf and Hard of Hearing," and Jack Ashley, Britain's only deaf Member of Parliament, who visited Gallaudet and gave a presentation on the employment of deaf people in Great Britain.*

*At Commencement, 1988, Dr. William C. Stokoe, former Director of the GRI's Linguistics Research Laboratory, was awarded an honorary Doctorate of Letters.*



*Raymond J. Trybus, former Dean of Graduate Studies and Research, says "Farewell" after 17 years at Gallaudet, 10 of those with the Gallaudet Research Institute.*

# Gallaudet Research Institute Units and 1987/88 Projects

# Center for Assessment and Demographic Studies

*Thomas E. Allen, Director*

*Faculty/Staff:*
*Dorothea Bateman*
*Carol A. Bloomquist*
*Scott Campbell Brown*
*Peck Voon Choo*
*Kevin J. Cole*
*Linda L. Fields*
*Judith A. Holt*
*David R. Hotchkiss*
*Sue A. Hotto*
*Kay H. Lam*
*Russell E. Perkins*
*Alexander Quaynor*
*Brenda W. Rawlings*
*Gail F. Ries*
*Arthur N. Schildroth*
*Mary Carole Starke*
*John K.C. Woo*
*Hank Young*

The Center for Assessment and Demographic Studies (CADS) was established in 1968 to collect information about hearing impaired children and youth. Its mission ever since has been to provide information helpful for the improvement of educational opportunities for hearing impaired youth. The main project of the center is the Annual Survey of Hearing Impaired Children and Youth, the largest ongoing database in the world concerning hearing impaired, school-aged children. In the last few years, the work of the center has expanded to include older hearing impaired individuals and persons with other disabilities.

*Thomas E. Allen*

Early in its history, CADS became involved in analyzing and publishing data about the educational attainment of the students reported to its Annual Survey. It has conducted five national achievement testing projects, two of which, in 1974 and 1983, have included the norming of the Stanford Achievement Test for hearing impaired students. CADS has become a source for the distribution of special test materials and analyses of test results that can help schools improve their instructional strategies.

Examples of recent studies in areas beyond the school-aged population include a study of the transition of hearing impaired students from school to work and two analyses of National Institutes of Health databases that are examining aspects of hearing impairment among older Americans. The center also collaborated with the United Nations in creating an international database on disabilities.

In addition to these projects, a contract with the department of education in Texas has continued to provide opportunities to study certain groups of students in greater detail than can be done through the Annual Survey. Also, CADS has recently conducted studies of classroom communication practices, postsecondary education opportunities for deaf students, and the assessment of deaf students' writing abilities.

# Annual Survey of Hearing Impaired Children and Youth

*GRI Investigators:*
*Arthur N. Schildroth*
*Sue A. Hotto*

*Project Duration:*
*1968 to present*

*Sue A. Hotto and Arthur N. Schildroth examine some of the twentieth Annual Survey's data.*

As was pointed out on the inside cover of this report, researchers in what is now called the GRI's Center for Assessment and Demographic Studies (CADS) have been collecting demographic, audiological, and other educationally relevant information on hearing impaired children for twenty years by means of the Annual Survey of Hearing Impaired Children and Youth.

We use the survey to collect data primarily on hearing impaired youngsters receiving special education in elementary and secondary schools across the United States. The resulting information is used by a wide variety of individuals and organizations: state and federal education officials, local education staff, and other researchers.

This year, the federally appointed Commission on Education of the Deaf extensively cited articles based on Annual Survey data in its final report to Congress: Toward Equality: Education of the Deaf, published in February, 1988. The Annual Survey database has also been an invaluable resource for numerous in-depth studies of such subjects as deaf students' academic achievements, communication environments, and transitions from school to work.

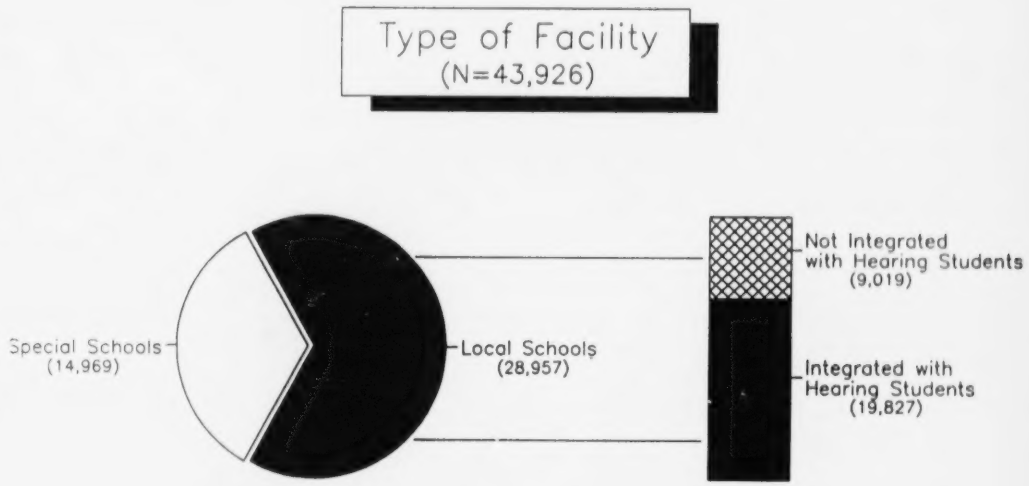
The design of the Annual Survey questionnaire begins anew each summer. We print the revised forms in late fall and mail them to schools in January. Intake and in-house editing of the completed forms continues into the summer. (For the first time during the 1987-88 school year we scanned the forms in-house CADS' new Cognitronics scanner.) We complete editing and production of the survey file by October and send individual student reports to each participating school and cumulative summaries of the data for each state to state special education directors.

Participating school programs also receive summary reports of their own data, along with national, regional, and statewide data for comparative purposes. In 1988, for the first time, we are able to send out these program summaries, when requested, as soon as a school's data are received. To do this we use the previous year's national, regional, and state information as the basis for comparisons.

During the 1986-87 school year, 47,162 hearing impaired children were reported to the Annual Survey, a slight drop of 3% from 1985-86. (A similar decrease [slightly over 2%] was noted in the "child count" figures on deaf children reported to the federal government by each state between 1985-86 and 1986-87.) Enrollment of hearing impaired students in residential schools continued to decline in 1986-87. Local schools, however, reported enrollments of larger numbers of hearing impaired students. This slow, continuing change in the placement of deaf students--from special

schools to local schools--and its effects on the education of these children are the subjects of numerous ongoing studies by CADS' staff.

The percentage of hearing impaired children reported to have handicaps in addition to their hearing impairment remained the same this year as last: 29% of the total. Learning disability and mental retardation continued to be the most frequently reported additional handicaps. Heredity was reportedly the cause of hearing loss for 13% of the children in 1986-87, and meningitis continued to be the most frequently reported after-birth cause (9%). As has been the case since the beginning of the survey, there were very large numbers of students with "cause unknown" or "cause could not be determined" reported by the schools.




Source: 1986–87 Annual Survey of Hearing Impaired Children and Youth
(Center for Assessment and Demographic Studies, Gallaudet University)

*Enrollment of hearing impaired students in special schools continued to decline in 1986-87, but local schools reported larger numbers of hearing impaired students in both integrated and non-integrated ("self-contained") settings.*

# Texas State Survey of Hearing Impaired Children and Youth

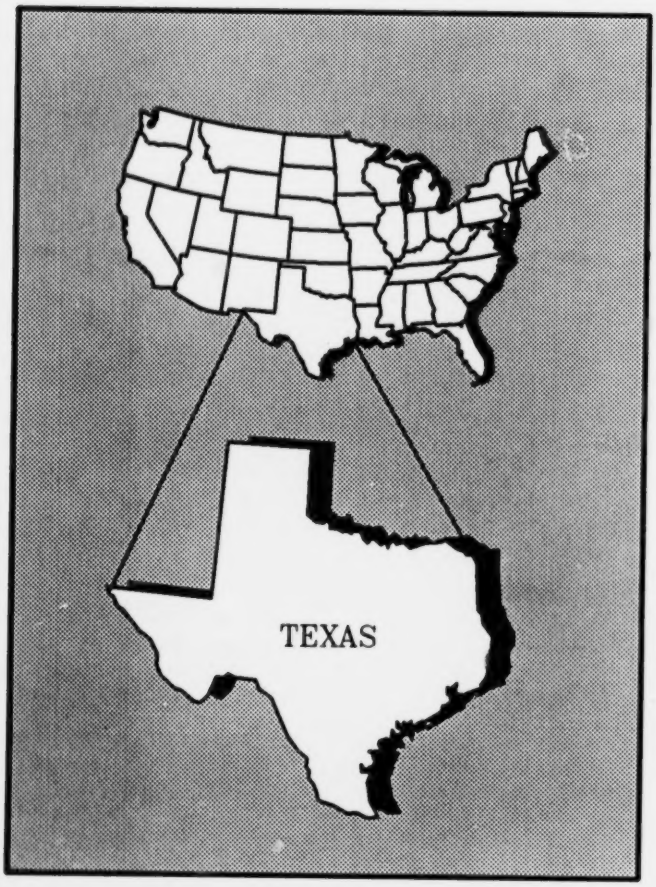
*GRI Investigator:*
*Brenda W. Rawlings*

*External Collaborators:*
*Gary Curtis and*
*Dean Cunningham*
*Texas Education Agency*

*Extramural Funding:*
*Texas Education Agency*
*$38,500*

*Project Duration:*
*Sept., 1987 to Aug., 1988*

For the 12th consecutive year, the Texas Education Agency contracted with the Center for Assessment and Demographic Studies to maintain a computerized database concerning hearing impaired children in Texas. The comprehensive database provides demographic information needed for local, regional, and statewide educational planning purposes. It also provides data to monitor changes in the population over time and to assess educational achievement for this population.




Texas Education Agency administrators specified their educational planning issues for the year and we designed a data collection instrument to obtain the needed information. Using this special survey form, we collected demographic information on over 4,000 hearing impaired children from approximately 80 different educational agencies in Texas, including all regional day school programs, the Texas School for the Deaf, and two private educational institutions for the hearing impaired.

We edited and verified the completed forms, then optically scanned them into a computerized database for compilation. Our programmers also wrote all the necessary computer programs for data analysis. We sent a variety of reports based on this information to individual schools, regional offices, and the Texas State Office of Services for the Deaf.

One key issue in this project has been the assessment of academic progress. We provided the schools with Stanford Achievement Test materials, including screening tests, practice tests, complete test booklets, and administration manuals to enable programs to test all hearing impaired students eight years of age and older. We also scored the test documents and returned individual student score reports, as well as school summary reports, to the programs.

The Texas Education Agency has awarded the 13th contract to the Gallaudet Research Institute for the continuation of this special survey during the period of September 1, 1988, through August 31, 1989.

# Venezuelan Survey, 1986-87

*GRI Investigators:*
*Arthur N. Schildroth*
*Sue A. Hotto*

*External Collaborator:*
*Irene Terrero*
*Ministry of Education*
*Caracas, Venezuela*

*Project Duration:*
*Jan., 1985 to present*

The Venezuelan Survey, begun in 1985 to collect demographic, audiological, and educational data concerning Venezuelan hearing impaired children and youth, is a collaborative project between the Center for Assessment and Demographic Studies and the Venezuelan Ministry of Education. The resulting data base will be used to expand educational opportunities for hearing impaired children in Venezuela. A further purpose of the collaborative project is to foster cross-cultural research in Venezuela, the United States, and other Latin American countries.

During the first year of the project (1984-85), the Venezuelan Survey team collected data on 804 children, largely within the "Federal District," which includes the capital city of Caracas. The 1985-86 Survey was extended to four other Venezuelan states, resulting in data on 1,426 hearing impaired children and youth. During that time, the survey form was translated into Spanish, and this new Spanish form was made available for the 1986-87 Venezuelan Survey.

The data collected during 1986-87 are still being processed; preliminary findings will be available in the fall of 1988. It should be noted that several factors related to this project delayed collection and processing of the 1986-87 forms: the school years in Venezuela and in the United States do not coincide; the distance between the two countries hinders timely response to questions that were generated by the new Spanish translation of the survey form; illness within the survey staff in Venezuela delayed the collection of the survey forms there; difficulties in scanning the responses on the new Spanish version necessitated the creation of a special computer program.

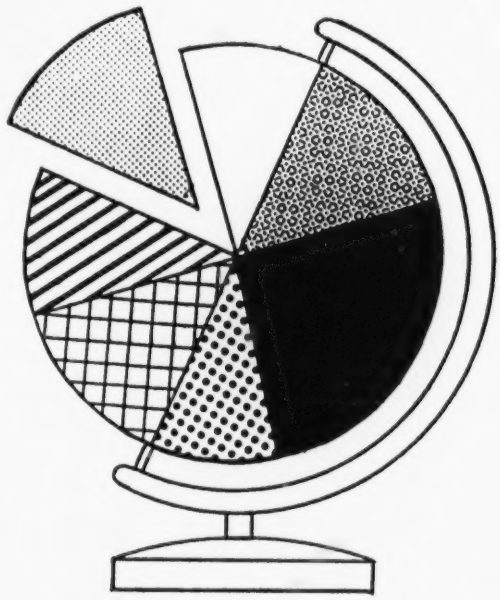
There have been several other survey developments in South America: Dr. Terrero, of the Ministry of Education in Venezuela, was also able to collect data on hearing impaired children being educated in Bogota, Columbia. We now have those data forms and will attempt to compare the data from Bogota with that collected in Caracas; on a recent visit to Argentina, one of our colleagues made contact with special education staff there, and a proposal has been made to conduct a pilot project to study the feasibility of an Argentinean Survey as well.

# Global Advances in the Demography of Disability

*GRI Investigators:*
*Scott Campbell Brown*
*David R. Hotchkiss*

*External Collaborator:*
*Mary Chamie*
*United Nations Statistical Office*

*Project Duration:*
*Feb., 1986 to March, 1987*



On December 7 and 8, 1987, the Gallaudet Research Institute and the United Nations Statistical Office co-sponsored the first international workshop held to discuss the nature and possible uses of our collaboratively developed United Nations Disability Statistics Data Base. This data base consists of census and survey data from 55 U.N. member countries, compiled in accordance with the World Health Organization's (WHO's) system for an International Classification of Impairments, Disability and Handicaps (ICIDH). The ICIDH, issued for trial purposes in 1980, established a coherent conceptual framework for gathering international data on the demography of disability and helped resolve problems resulting from the diversity of terms and definitions used in different countries for gathering such data. We believe that our use of the ICIDH has made the United Nations Disability Statistics Data Base the richest and most reliable source of information on disability around the world.

The data in the new Data Base pertain to the sizes and situations of those 55 countries' disabled populations. The U.N. intends to use these statistics to help monitor needs for community programs and policies concerning disabled groups in those nations and to inform policy makers, program planners, service providers, researchers, and disabled people themselves of significant facts about disabled groups.

To create the Data Base, we used Lotus 1-2-3 software, first storing and subsequently manipulating the available census data. We grouped the data under 22 headings, including the age, sex, place of residence, level of education, and economic status of disabled individuals. We can now analyze the data by country, type of disability (as defined by the ICIDH), or any of the other categories.

We and the U.N. investigators hope to encourage other organizations interested in large-scale demographic, social, and health-related data gathering to incorporate more questions concerning disabled people into their surveys to augment our Data Base. We believe that sharing space on multipurpose surveys would be less expensive and would probably yield better results than separately constructed surveys.

The variety of opinions expressed at the December workshop about how best to use the Data Base made it clear that conceptual frameworks and data bases

have to be flexible in order to meet a variety of needs. Participants agreed that because the WHO's ICIDH and the U.N.'s Disability Statistics Data Base do have such flexibility, it is critical that users exercise good judgment in defining precisely what they are attempting to measure and determining which aspects of the ICIDH or the Data Base would be most helpful for making the needed measurements. In other words, users should evaluate problems in their own terms first, then use the ICIDH or the Data Base to address them rather than try to redefine or "straight-jacket" the problems themselves to meet these resources' real or imagined limitations.

Implications of language were also a concern at the workshop. This theme emerged in comments concerning the fact that both the ICIDH and the Data Base were designed by English speakers. Moreover, some participants took issue with each of the following terms: "impaired," "disabled," and "handicapped."

Problems of language, though real, did not appear to diminish the desires of representatives of several countries to obtain statistical information useful for planning aspects of those countries' medical care, rehabilitation, and/or social policy. They emphasized that data continue to be needed on the prevalence and characteristics of persons with various disabilities (or "sequelae"), with differences in abilities to perform certain activities, and with various disadvantages (such as mobility problems, etc.) that might be environmentally alleviated. Both the Data Base and the ICIDH, some of these individuals pointed out, can be used to evaluate the extent to which particular countries have promoted effective measures to prevent disablement, to provide for rehabilitation, and to realize the goal of full participation of disabled persons in social life and development through equalization of opportunity. Several times during the workshop, participants urged that statisticians, policy makers, and the world-at-large need to view the whole picture of the disablement experience while at the same time being sensitive to the needs of individual people. The architects of both the ICIDH and the Data Base indicated that they shared these concerns. The ultimate test of the ICIDH and the Data Base, one presenter said, will be the extent to which they prove useful in positively affecting individual lives.

*Conference participants Harold Schneider and Henry Enns*

*Scott Brown (right) discussing U.N. Disability Data Base with a presenter and an interpreter from China.*

# Seventh Edition Stanford Achievement Test: Distribution and Services

*GRI Investigators:*
*Arthur N. Schildroth*
*Sue A. Hotto*
*Russell Perkins*
*Peck Voon Choo*
*Alexander Quaynor*
*Linda Fields*

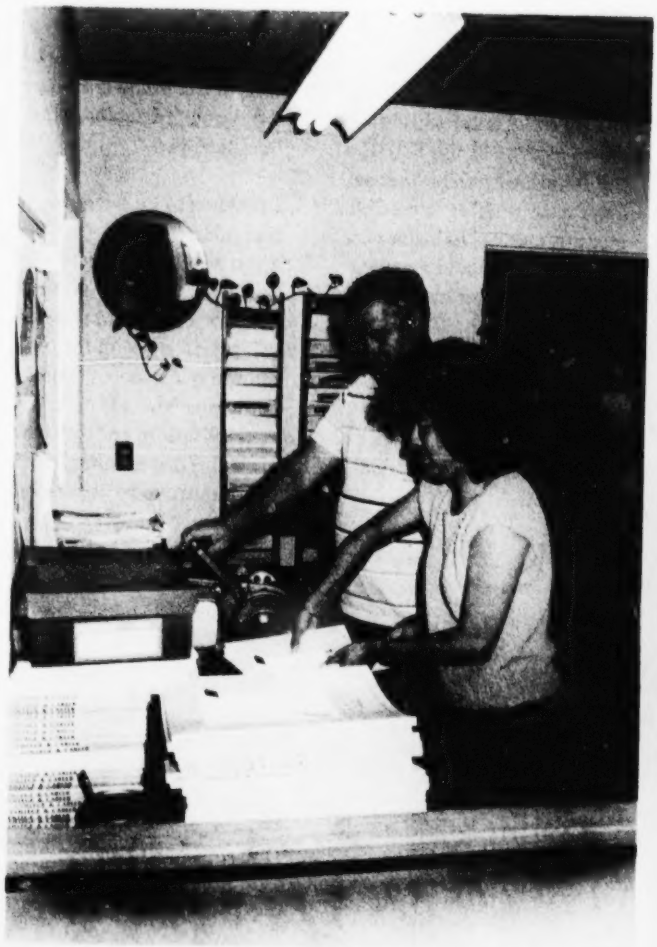
*Project Duration:*
*1974 to present*

Since the 7th Edition Stanford was normed on hearing impaired students in the spring of 1983, we have distributed the testing materials and the special norms to schools and programs serving hearing impaired children and youth, and have answered numerous phone and mail requests regarding interpretation of the test scores.

In addition to the distribution of test materials, we have provided several special scoring services to schools serving hearing impaired students. For example, screening tests of 3,328 students from 44 schools were scored at the Center, and the results returned to the programs. For the second year, we also offered a special school/class score analysis, called the "Student-Problem Analysis." Eleven schools, enrolling 1,558 hearing impaired students, requested and received this service.

In addition, 101 schools, enrolling 13,807 hearing impaired students, requested and received special achievement test reports during the 1987-88 school year (from July 1, 1987, through June 30, 1988). Several other programs requested special achievement test analyses which we were able to produce from tapes sent by the schools.

At this time, we must decide whether we will norm the new 8th edition Stanford Achievement Test, which will become available in the spring of 1989, or devote our time to some other projects in the testing area.



*Russell Perkins and Peck Choo assemble materials for distribution to schools and programs serving hearing impaired students.*

# Further Study of Hearing Impaired Students' Achievement through the Use of the CADS' 1983 Stanford Achievement Test Data Base

*GRI Investigators:*
*Thomas E. Allen*
*Judith A. Holt*
*Carol A. Bloomquist*

*External Collaborator:*
*Herbert J. Walberg*
*Univ. of Illinois at Chicago*

*Extramural Funding:*
*U.S. Department of Education, Office of Special Education and Rehabilitative Services*
*$75,901*

*Project Duration:*
*July, 1986 to Aug., 1987*

This project has two primary purposes: (1) to conduct a "productivity model analysis" of relationships between the 1983 Stanford Achievement Test results among hearing impaired students and the demographic and educational information gathered through a supplementary questionnaire sent to teachers of 2,875 of these students randomly selected from the 1983 norming sample; (2) to conduct an examination of the psychometric properties of individual items on the Stanford tests as answered by all 8,331 hearing impaired students who took the tests as part of the 1983 norming sample.

In the productivity model analysis, we paid particular attention to the relationships between reading and mathematics achievement levels and such alterable aspects of students' educational experiences as their grade placement, exposure to certain curricular materials, extent of integration with hearing students during instruction, and amount of time devoted to various instructional tasks. The effects of these alterable school factors were analyzed as independent variables in a multiple regression context in conjunction with other fixed demographic and handicapping factors that have been shown to be predictors of achievement, such as gender, age, and ethnicity. Although the alterable factors all have a positive effect on achievement, two of them, "time on task" and "exposure to content," show diminishing returns over time. That is, thirty minutes spent on a task may produce certain positive results, but one hour or more spent on the same task may actually begin to produce negative results rather than twice the positive results.

When the effects of the fixed demographic and handicapping factors are statistically controlled, the effects of the alterable factors are all somewhat moderated. In addition, the interactions of "integration" and "exposure to content" with "communication skill" and "ethnicity" indicate that students at different levels of communication skill and in different ethnic groups benefit in different degrees from integration and content exposure. When the effects of "prior achievement" are also statistically controlled, the productivity models indicate that the effects of higher "grade placement" and "integration" become more complex and may actually have a negative effect on some groups of hearing impaired students.

In addition to analyzing the relationships between the alterable school factors and achievement, we also analyzed the alterable factors in terms of their relationships with the fixed demographic and handicapping factors. We found that hearing impaired students who are integrated with hearing students for instruction are more likely to be younger, have less severe hearing loss, and have better communication skills than those hearing impaired students who are not integrated. More white hearing impaired students are integrated than are those from other racial groups.

In our psychometric analysis, we subjected responses from the Reading Comprehension, Mathematics Computation, and Mathematics Applications subtests of the Stanford to two Rasch analyses. In the first, the data from the hearing impaired students were considered separately from those of hearing students. In the second analysis, the difficulty parameters from the hearing standardization (provided to us by the test publisher) were set for each of the items. The actual responses made by hearing impaired students were then assessed for the degree to which they "fit" the parameter estimated for the hearing test-takers. These procedures enabled us to identify the test items that were most problematical for hearing impaired students.

In the Reading Comprehension section of the Stanford,

hearing impaired students encountered the greatest difficulty with test items related to auditory experience. They also tended to focus excessively on details, whether in an item's reading passage or in the drawings that may accompany a set of items, and showed less awareness of the broader context of the reading passage. These findings suggest that hearing impaired students may benefit from more focused help to expand their frame of reference while reading.

Items in the Mathematics Applications section of the test ("word problems"), as might be expected, showed greater differentiation in difficulty for deaf and hearing test-takers than did Mathematics Computation items. The detrimental effect of test items' linguistic complexity on hearing impaired students' test performance extended throughout all of the test levels. The hearing impaired students did appear to use all of the information given in applications problems; their incorrect responses were more likely to reflect the selection of an mathematical operation inappropriate for solving that applications problem rather than the selection of or elimination of individual pieces of information stated in the problem. Therefore, at least at earlier test levels, instructional time need not be devoted to teaching hearing impaired students to include

all relevant information in word problems. However, as test publishers respond to the strong movement among mathematics educators away from "word problems" to "problem solving" in mathematics applications, the selection of relevant information and the exclusion of irrelevant information is likely to become more important as a focus of mathematics instruction. The missing/irrelevant data items that were included at upper levels of the Stanford proved to be more difficult for hearing impaired students.

Mathematics test score interpretation for hearing impaired students should take into consideration the generally lower validity of mathematics applications tests compared to mathematics computation tests, as well as the generally lower validity of the lower levels of the Stanford for these students. Because linguistic difficulty in applications items affects the test performance of hearing and hearing impaired students in different ways, it is very important to consider mathematics computation and applications scores separately and not use one as a proxy for the other. Finally, because the inclusion of linguistically-complex test items will clearly be a disadvantage for hearing impaired test-takers, test developers would do well to have mathematics test items reviewed for language that would interfere with the valid assessment of hearing impaired students' mathematics achievement.

Our principle focus during this past year has been dissemination of the results of the analyses. Our dissemination activities have included papers on the productivity model analysis, the psychometric analysis, and the statistical methodology used in the study. Next year we will have an article on the productivity model analysis published in a special issue of the International Journal of Education Research, edited by Dr. Thomas Allen.

# A Comparative Study of Different Methods for Assessing the Writing Abilities of Hearing Impaired College Students

*GRI Investigators:*
*Carol A. Bloomquist*

*Collaborating Faculty/Staff:*
*Virginia C. Covington*
*English Dept.*

*External Collaborator:*
*Mary E. Fowles*
*Educational Testing Service*

*Project Duration:*
*Oct., 1985 to Oct., 1987*

This study was designed to help meet Gallaudet's needs in the area of writing assessment and to share recent advances in the field of writing assessment with educators and researchers interested in the writing skills of hearing impaired students.

The project began with a one-day symposium entitled "The state of the art in writing assessment: Focus on hearing impaired students," held at Gallaudet in January, 1986. Six nationally-recognized experts in writing assessment spoke to an audience of over 150 educators, researchers, and parents of hearing impaired children on issues in the field of writing assessment in general and their relation to the writing of hearing impaired students.

In the second phase of the study, we selected writing samples produced by 590 Gallaudet students on the Gallaudet Writing Sample, a portion of the English Placement Test required at that time for admission to Gallaudet and for placement in credit-bearing English courses. Our goals were to examine the interrelationships among different scoring strategies, to discover which of the strategies was the best predictor of academic achievement and success at Gallaudet, and to determine the interrater and alternate forms reliabilities, using different scoring procedures. We selected papers written by 107 of the 590 students in the sample, and had their papers rescored by nine readers according to three sets of scoring criteria then in use at Gallaudet. We then combined the new and original writing scores with the subjects' academic and demographic data to examine the Writing Sample's psychometric properties. Our ongoing data analysis is focusing on various aspects of reliability and validity.

The third phase involves linguistic analyses of writing produced over a two-year period by a subgroup of 56 students selected from the 590 whose Gallaudet Writing Sample scores were analyzed during part two of the study. These linguistic analyses are being conducted, in part, with the goal of providing suggestions for changes in Gallaudet's writing curriculum. The papers are being rescored for such specific features as verbs and subordination; these scores will be correlated with the previous scores.

The final stage of our study involves the preparation of a book based on the original symposium, entitled The state of the art in writing assessment: Focus on special students. The book, to be published in 1989 by College Hill Press, has expanded the focus of the original meeting to include not only hearing impaired students but other special students as well. The book will present sections on measurement considerations in writing assessment, methods of planning and conducting a successful writing assessment program, and applications of alternative scoring criteria to essays written by hearing impaired, emotionally disturbed, and learning disabled students. In the book we will present illustrative scoring criteria and provide an opportunity for readers to compare their own scoring with that of experts in the field scoring the same essays.

*"The State of the Art in Writing Assessment: Focus on Special Students," a symposium held at Gallaudet, was the first step in this project.*

# Investigating the Use of the TOEFL Test of Written English with Gallaudet Students

*GRI Investigator:*
*Carol A. Bloomquist*

*External Collaborator:*
*Marjorie Ragosta*
*Educational Testing Service*

*Project Duration:*
*Oct., 1987 to March, 1989*

One issue educators face is how best to assess the written English skills of hearing impaired students. Because English is considered to be a second language for many early deafened individuals whose native language is American Sign Language (ASL), we wanted to investigate the appropriateness of using assessment tools designed for other English-as-a-second-language groups with a hearing impaired population.

One language assessment tool that may be used in college admission decisions involving foreign applicants is the Test of Written English (TWE), a component of the Test of English as a Foreign Language (TOEFL). In this 30-minute direct writing assignment, college applicants who are non-native users of English respond to an essay question (a "prompt") to demonstrate that they have sufficient English language proficiency to study in an English-dominant environment. The prompts are designed to be appropriate for use with different cultural groups and the scoring of the essays takes into account the different cultural backgrounds in which students learn to write.

Our present study examines the appropriateness of using TOEFL's Test of Written English (TWE) component in assessing the writing skills of Gallaudet students and of hearing impaired college students in general. This collaborative investigation between Gallaudet and the Educational Testing Service (ETS, the publisher of TOEFL) includes an analysis of Gallaudet student scores on the TWE as well as a compilation of opinions from experts in the fields of deaf education, college admissions, and testing regarding the potential use of this test by institutions serving hearing impaired students.

On November 21, 1987, one of the international TOEFL testing dates, we administered the writing prompt given to examinees in Asia to a sample of 100 Gallaudet students, mostly upperclassmen. The Asian prompt was selected for use in our study over the prompts given in European countries because certain of the iconic and pictographic features of Asian languages may have similarities with features of ASL. The resulting essays were then coded and channeled into the TOEFL/TWE scoring process at ETS, undistinguishable from the essays produced by the foreign examinees.

The ETS scored the Gallaudet essays (and those of the foreign students) holistically, that is, for overall effectiveness of the communication rather than on separate analytical criteria such as structure, spelling, punctuation, or word usage. Our preliminary analysis of the scores provided by the ETS reveals that the Gallaudet student essays received a range of scores, from the highest ("clearly demonstrates competence in writing on both the rhetorical and syntactic levels, though it may have occasional errors") to the lowest ("demonstrates incompetence in writing"). Such a range of scores indicates that the TWE is appropriate for use with students similar to those tested in this study.

During the coming year we will conduct further analysis of the Gallaudet scores and compare them with those of foreign examinees responding to the same prompt. When data analysis has been completed, we will present our final conclusions and recommendations regarding the use of the TWE in assessing the writing skills of hearing impaired college students.

# Assessment Research Related to the Electronic Network for Interaction (ENFI)

*GRI Investigator:*
*Carol A. Bloomquist*

*Collaborating Faculty/Staff:*
*Joy Kreeft Peyton*
*ENFI Project and Center for Applied Linguistics*

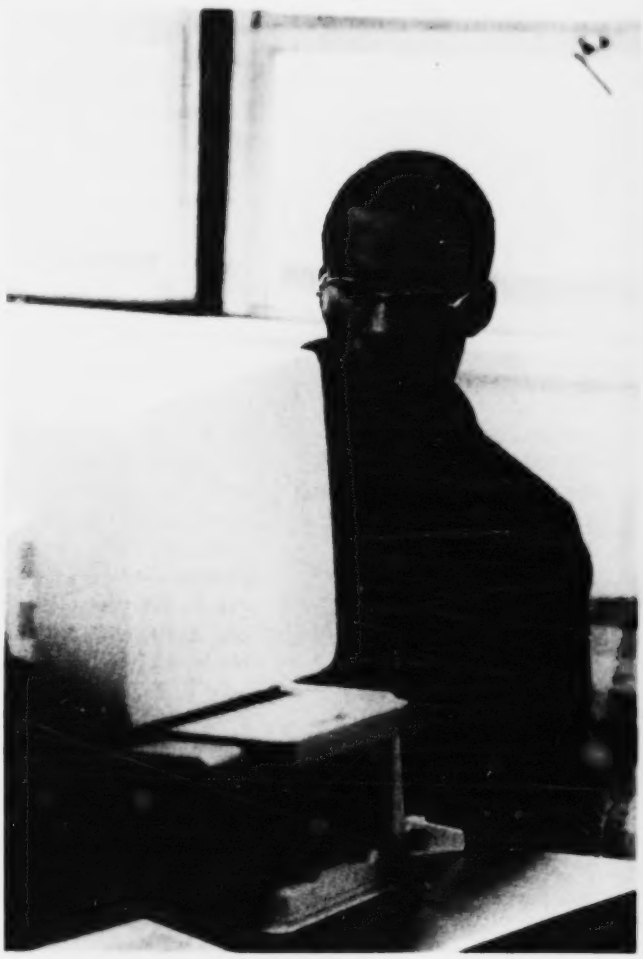
Consultants have been hired by Gallaudet University to determine the effectiveness of its ENFI program ("Electronic Network for Interaction," formerly "English Natural Form Instruction"). ENFI is an instructional approach in which writers interact with one another in real time through a computer network, thus giving hearing impaired students the opportunity to use English for communicative purposes rather than solely to accomplish academic tasks. This approach is now being used not only with hearing impaired students at Gallaudet University and Kendall Demonstration Elementary School, but at a consortium of universities with hearing students as well.

To evaluate the ENFI program, however, the evaluators first had to select assessment instruments appropriate for use with a hearing impaired population, and chose to look at several extant instruments designed for use with hearing students, including the Daly-Miller Writing Apprehension Questionnaire and Reid's Learning Style Preferences Questionnaire, rather than develop new assessment tools for this project.

The Daly-Miller Writing Apprehension Questionnaire determines the levels of apprehension students feel about writing. Our task was to establish the reliability and validity of the Daly-Miller when used with hearing impaired college students. Over a two-semester period, 377 Gallaudet students in prep, freshman, and sophomore English classes completed the questionnaire. Although this was a small, non-random sample, our analysis of the results provides support for the internal consistency reliability and construct validity of the writing apprehension score. In addition to a total writing apprehension score, separate scores measuring "enjoyment/dislike of writing" and "perceived ease/difficulty of writing" have been shown to be reliable and valid. The study has also provided some normative data about the writing apprehension of hearing impaired students which can be used as a basis of comparison in future studies with this population.

Another assessment instrument examined for this study was Reid's Learning Style Preferences Questionnaire. Because few instruments have been designed to determine student learning styles in nonnative users of English, we administered Reid's Learning Style Questionnaire to a group of 142 hearing impaired Gallaudet college and precollege students to examine the validity of the instrument in identifying their learning style preferences. Our analysis of the responses to this questionnaire have provided some preliminary validity evidence and normative information for the use of this questionnaire with hearing impaired students.

We are now continuing our research on the use of these two instruments, and are beginning to collect data using Palmer's Computer Anxiety Questionnaire as well. Once all the data have been analyzed and the validity of these instruments has been established with a hearing impaired population, they can then be used in research about the ENFI program.



# National Educational Longitudinal Study (NELS): Hearing Impaired Supplement

***GRI Investigators:***
*Judith A. Holt*
*Thomas E. Allen*

***External Collaborators:***
*National Opinion Research Center (NORC)*
*Univ. of Chicago*

***Project Duration:***
*Oct., 1981 to Present*

The Center for Assessment and Demographic Studies (CADS) is cooperating with the National Opinion Research Center (NORC) on a project for the U.S. Department of Education's Office of Educational Research and Improvement, entitled "National Education Longitudinal Study (NELS)." This study, the largest federally-funded longitudinal study designed to date, will include extensive surveying and testing of approximately 30,000 students over a ten-year period.

The NELS project involves the collection of data from students, parents, and teachers on hundreds of demographic, educational, vocational, sociological, psychological, and health variables. These variables include a comprehensive measure of socioeconomic status, questions about school curricula and levels of achievement, information about educational and vocational aspirations, questions regarding self-image, information about handicapping conditions, and information regarding drug education and related attitudes.

In recent years, the field of education of hearing impaired students has witnessed tremendous changes. Due to changing demography and to recent federal legislation which mandates placing hearing impaired students in least restrictive environments, these students are being mainstreamed with hearing students to a much greater degree than in the past. Formerly, the majority of students with significant hearing loss attended residential or day programs designed exclusively for hearing impaired students. While special schools continue to exist, they no longer claim a majority of these students.

Comparisons of the 1977-78 and 1985-86 Annual Surveys of Hearing Impaired Children and Youth reveal that the percentage of hearing impaired students reported as being integrated with hearing students during academic instruction at least part-time increased from 33% to 53%.

Therefore, national studies of hearing impaired students in the mainstream are crucial to determining the efficacy of this practice. The ability to compare responses of hearing impaired students to those of both their hearing peers and their counterparts in special schools will greatly facilitate an understanding of the merits and problems of mainstreaming.

In our part of the project, we are sampling hearing impaired students in mainstream schools, by collecting data for all hearing impaired students in each school in the NORC study. During the fall of 1987 NORC identified all hearing impaired students attending schools in the NELS survey. Those schools were then cross-referenced with the local schools in the 1986-87 Annual Survey, to identify overlapping schools. Student information in the Annual Survey is confidential, so NORC had to obtain permission from the overlapping schools to release names of Annual Survey students so that appropriate questionnaire materials could be prepared for those students. This cross-reference will also enable us to identify schools serving hearing impaired students that are not currently included in the Annual Survey data base and to evaluate the extent of our Annual Survey coverage in local schools.

*"The ability to compare responses...will greatly facilitate an understanding of the merits and problems of mainstreaming."*

During spring, 1988, NORC began collecting data from students, parents, and teachers. Approximately 120 hearing impaired students were included in the sample. The data for the hearing impaired students will be made available to us for analysis.

Future plans for our collaboration in the NELS project are contingent upon funding. Those plans include (1) further data collection on the hearing impaired students in the mainstream schools, (2) longitudinal analysis of the data collected in the mainstream schools, (3) data collection for a matched sample of hearing impaired students in residential and day schools, and (4) statistical comparison of the mainstreamed with the non-mainstreamed students.

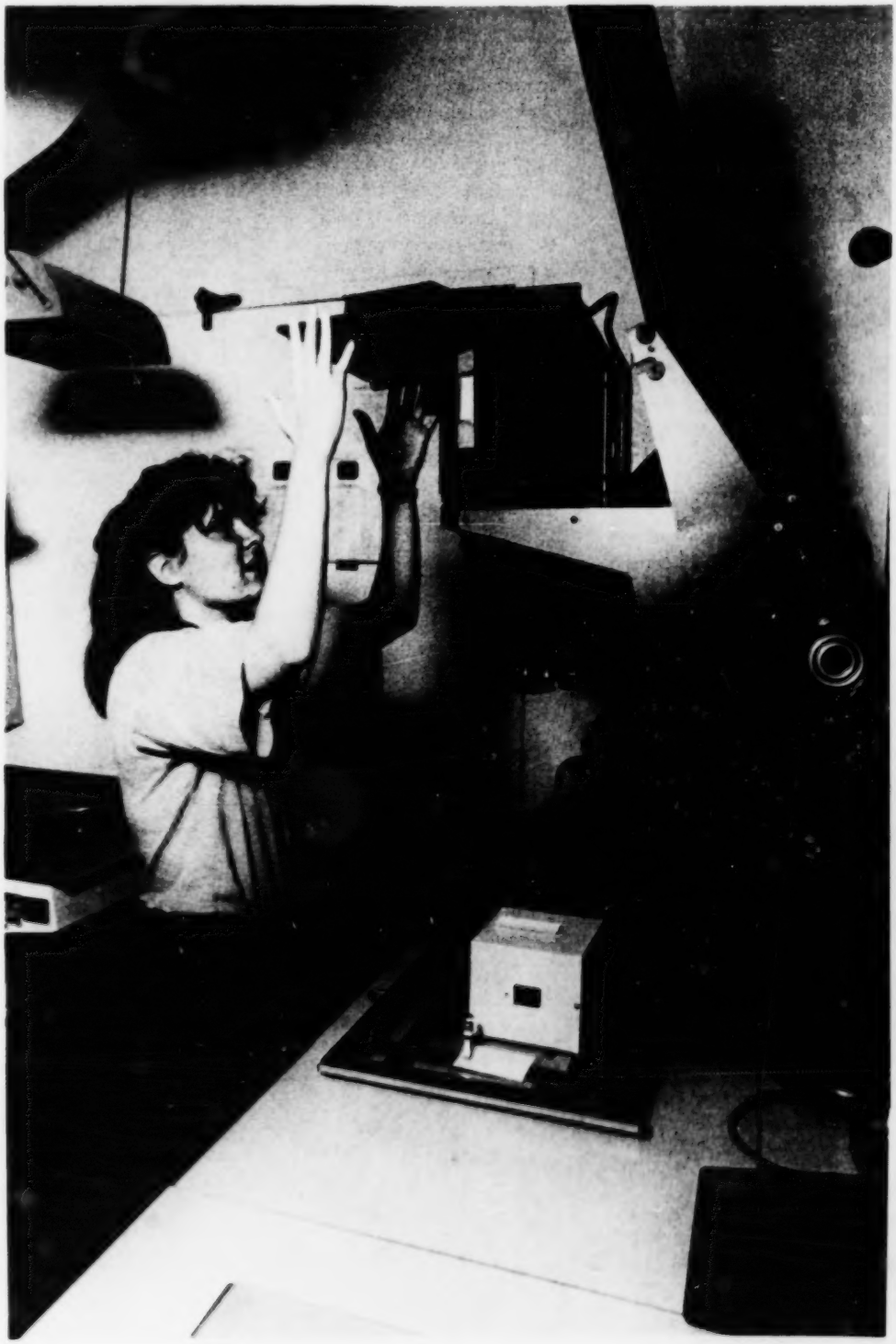
# Deaf Students in Transition from School to Work

*GRI Investigators:*
*Brenda W. Rawlings*
*Thomas E. Allen*
*Arthur N. Schildroth*

*Project Duration:*
*Sept., 1986 to May, 1989*

The transition of students from school to work is a topic of great interest to educational planners at the federal, state, and local levels. Yet, until now, there has been no comprehensive study of the experiences and special service needs of severely and profoundly hearing impaired youth as they exit high school and enter the workplace. Our review of current research literature on this topic does show that the anticipated special service needs of the overall population of special education students exiting from high schools in the next few years will be far greater than can be handled by available school and community services.

Our goal in this study, which began in September 1986, has been to describe the vocational training, work experience, and support services provided to severely and profoundly deaf youth currently enrolled in special education programs. We are also exploring apparent relationships between the demographic characteristics of these youth and their vocational and work experiences.



An additional goal of the project has been to describe the relationship between special schools (residential and day), local schools (the "mainstream"), and state offices of Vocational Rehabilitation. We are attempting to determine (1) if and when VR services are provided to schools, (2) the kinds of VR services that are provided, (3) the communication abilities of VR counselors, and (4) the extent to which written agreements are made between VR agencies and educational institutions.

The 8,285 severely and profoundly deaf youth whose experiences we are studying consist of all those in the database of the 1985-86 Annual Survey of Hearing Impaired Children and Youth between 16 and 22 years of age as of December 31, 1985. These young people at that time were attending a total of 645 schools. We asked the administrators of each of the 1,700 schools participating in the Annual Survey to provide information about his or her program's relationship to the state VR office.

A four-page student questionnaire was completed by 75% of the students we contacted. Students provided information on their work experience and methods used to obtain employment. They also reported, when appropriate, on factors associated with their unemployment. We surveyed the school counselors of these selected students and obtained information on several aspects of the vocational training opportunities provided; 75% of the counselors completed and returned the questionnaires.

We edited and compiled the student and counselor data into a computerized database. Then we merged these records with demographic information on the students from the Annual Survey to provide a more complete picture.

In the spring of 1988, we conducted a follow-up survey of these students. We also contacted their parents, seeking information on their children's experiences obtaining services through vocational rehabilitation agencies. We are now editing and data-processing the information as part of a long-range study tracking the experiences of over 2,000 of these youth.

We are currently analyzing the data and writing papers for presentation at several national conferences. Also, Paul Brookes Publishers will publish a book: Deaf Students and the School-to-Work Transition, presenting our findings. This book will be released in spring 1989.

# Studies in Postsecondary Education

*GRI Investigators:*
*Brenda W. Rawlings*
*Michael A. Karchmer*

*External Collaborator:*
*James J. DeCaro*
*National Technical Institute for the Deaf*

*Project Duration:*
*1973 to present*

There has been a dramatic increase during the last twenty years in the number of postsecondary educational institutions providing special programs for deaf students. Since 1973, investigators at Gallaudet University and the National Technical Institute for the Deaf at the Rochester Institute of Technology have routinely monitored these programs through surveys, seeking information about the numbers of deaf students served, the types of courses offered, the staffing patterns of the programs, and the availability of special support services for hearing impaired students.

The information we obtain in these surveys is widely used by a varied constituency. Higher education administrators and planners use the data for program planning purposes. Vocational rehabilitation counselors and school counselors use it to direct prospective students to appropriate programs. Deaf students use the information in selecting programs and in identifying career training opportunities. Recently, the data base has been extremely useful for large numbers of rubella-deafened youth completing their secondary education and seeking advanced academic and vocational training.

We gather data biennially from postsecondary institutions in the United States and Canada that offer programs specifically designed for deaf students. During the 1987-88 academic year, we reviewed the project methodology, updated the survey instruments, and developed plans for dissemination of the findings. In the spring of 1988, we contacted approximately 300 institutions of higher education and requested information regarding the services offered to deaf students.

Administrators of over 150 institutions returned completed forms regarding their programs. We then entered the information into a computerized data base. Since the 1986 data collection period, there has been a slight increase in the total number of programs identified as serving hearing impaired students. One problem we noted, however, is that it is becoming more and more difficult to distinguish between institutions with programs specifically designed for deaf students and those that provide support to deaf students through a more generalized office of disabled student services.

Data analysis and dissemination of findings occurred throughout the year. We made several presentations to national groups on the information obtained through our surveys. The seventh edition of the book, College and career programs for deaf students is currently in press and will be released in September, 1988.

COLLEGE & CAREER
PROGRAMS FOR DEAF STUDENTS
1988

*College & Career Programs for Deaf Students* is available for $12.95 per copy plus postage from the Center for Assessment and Demographic Studies at Gallaudet University. To order, detach and send the order form, along with a check or money order, to:

College & Career Programs
Center for Assessment and Demographic Studies
Gallaudet University
800 Florida Ave. N.E.
Washington, D.C. 20002

# Aging and the Interaction of Demography and Hearing Loss

*GRI Investigators:*
*Scott Campbell Brown*
*David R. Hotchkiss*

*External Collaborator:*
*Susan Ahmed*
*Georgetown University*

*Extramural Funding:*
*National Institutes of Health, National Institute on Aging*
*$352,330*

*Project Duration:*
*May, 1986 to April, 1991*

*There is a higher correlation between age and hearing loss among women than among men.*

Although the occurrence of hearing loss in older Americans is high, research on the association of various demographic factors with the process of hearing decline is relatively scarce. Consequently, our primary goal in this five-year project, which began in May, 1986, is both to increase the amount and to improve the quality of information available to service providers, researchers, and others, concerning the role such demographic and economic factors as sex, race, geographical region, marital status, education level, and occupation may play in the process of hearing decline among the United States' elderly population.

We hope to increase the applicability of the study's results by determining their relevance to a wide variety of countries, disabilities, and data sets, but the greatest immediate impact will likely be on service providers in the United States. Information from this study will give them a better idea of the statistical likelihood of various factors being linked to their clients' hearing loss.

We also hope to isolate factors related to disease or injury from those of "normal" aging to determine the extent to which each of these appears to be responsible for hearing loss among elderly people. The study, in other words, should help shed light on some widely debated questions concerning the status of normal aging as a possible cause of disability.

Data concerning 6,913 adults from ages 25 through 74 are being drawn from audiological test results, demographic information, and medical histories as gathered by the National Health and Nutrition Examination Surveys of 1971 and 1975 and the 1971 and 1977 supplements to the national Health Interview Study (HIS). We are using a variety of computer software packages to manipulate the data and perform the required statistical and demographic analyses.

Once we determined appropriate decibel hearing level cutoffs for summarizing the audiometric data, we divided the sample into three groups: 1) those with normal hearing, 2) those with mild to moderate hearing losses, and 3) those with moderate to profound hearing losses. Our analyses of the data so far indicate that both age and occupational noise exposure are important correlates of age-related hearing loss.

In order to discern the extent to which age itself is a significant factor in determining the threshold of hearing sensitivity, we classified by age and sex the results from pure-tone air conduction tests based on monaural hearing levels at four frequencies: 500, 1,000, 2,000, and 4,000 hertz (Hz). The measure we employed was the mean hearing threshold level, defined as the average lowest recorded intensity (over a specified number of trials) of a pure-tone just audible to the ear.

At 500, 1,000, and 2,000 Hz, men in their late 30s show a rise in the mean decibel level, with sharper increases in their 50s. While age and hearing level are correlated, the increments in hearing level by age tend to be consistent. For men, rises in mean hearing threshold by age tend to be more consistent at 4,000 Hz than at other frequencies. There tends to be a sharp rise above 70 years, particularly at 4,000 Hz.

Women show more consistent patterns than men. Their hearing thresholds tend to start rising in the early to late 40s and consistently rise thereafter. At 500, 1,000, and 2,000 Hz, there is a sharp rise around age 50. The increases at 4,000 Hz tend to be the most consistent of all four frequencies for women.

The higher the frequency, the higher the correlation between age and hearing loss. There are few consistent differentials in the association between age and hearing loss across the frequencies. At 500 Hz, women have a higher correlation of age and hearing loss than do men.

# Current and Future Needs of the Hearing Impaired Elderly

***GRI Investigators:***
*Scott Campbell Brown*
*David R. Hotchkiss*
*Thomas E. Allen*

***External Collaborator:***
*David Adams*
*DaTech*

***Extramural Funding:***
*Health and Human Services Administration on Aging*
*$74,133*

***Project Duration:***
*Aug., 1986 to Nov., 1988*

Our purpose in this recently completed two-year project was to develop for the Area Agencies on Aging and other service providers in the aging network an assessment of the current and future needs of America's elderly hearing impaired population. More specifically, we wanted to provide estimates and projections of the numbers of older people with various levels of hearing loss and to discern present and future characteristics of hearing impaired elderly people that tend to be associated with demands for assistive devices and health services. Ideally, after appropriate dissemination, our findings will serve as a basis for action among agencies across the country that provide health-related, assistive-device-oriented, and other types of services for hearing impaired elderly people.

We based the study on data from the 1971, 1977, and 1985 Health Interview Surveys conducted by the National Center for Health Statistics. Using those data--controlling for sex, race, and educational attainment--we determined that, in addition to age, sex and race are significantly associated with degree of hearing impairment.

This study reaffirms the findings of earlier studies that the prevalence rate of all degrees of hearing impairment increases with age. The data indicate that in 1985 the elderly population's chance of being hearing impaired was more than seven times greater than that of persons younger than 65 years of age. The 1977 data indicate that, for bilateral hearing impairment, the slope of the association increases after age 35, then rises more rapidly after age 75. Elderly persons were at least eight times as likely to have trouble hearing in both ears as persons younger than 65.

The prevalence rate of hearing impairment apparently varies by sex, race, and level of educational attainment. Our data suggest that men in all age groups are more likely than women to have hearing problems for

*Our data will help Area Agencies on Aging and other service providers prepare to meet the future needs of hearing impaired elderly people.*

all degrees of impairment. Whites, similarly, are more likely than blacks to have hearing problems. The prevalence of hearing impairment tends to decline with increasing educational attainment.

Hearing impaired elderly people apparently are more likely to be in poorer health than elderly people with normal hearing. In 1985, 13% of the surveyed hearing impaired persons 65 years of age and older reported themselves to be in "poor" health, while only 8% of normally hearing elderly persons reported this. For the 1977 bilaterally hearing impaired population, the percentage reported to be in either "fair" or poor health was 35% for those who could hear normal conversation, 47% for those who could hear shouted--but not normal--conversation, and 50% for those who, at best, could hear speech only when shouted into their better ear.

In addition, hearing impaired elderly people are more likely to report limitations in their range of activity. Over one half of all the surveyed hearing impaired elderly persons reported activity limitations, while only about one third of the surveyed normally hearing elderly people reported such limitations. Almost 70% of the elderly individuals who indicated they could at best hear speech only when shouted into their better ear also reported some limitations in their activity.

Using the same HIS data, we formulated a number of projections of prevalence rates of hearing impairment for various future dates up to the year 2015. These projections are based on models that illustrate the association between the prevalence of hearing impairments and certain demographic and socioeconomic variables. The models are based on the assumption that the age-specific prevalence rates of hearing impairment hold constant during the projection period and are therefore subject to error.

A few of our projections follow. These and others will be presented in greater detail in a monograph currently in preparation.

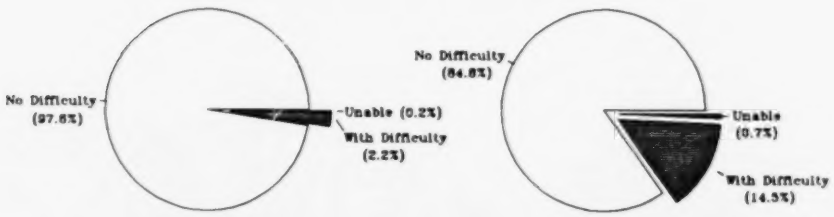
1. The overall rate of hearing impairment is projected to increase from 90.7 per thousand in 1985 to 109.6 per thousand by 2015.

2. Just as the United States population is projected to grow progressively older (its median age increasing from 31.4 in 1985 to 36.3 by 2000 and 38.8 by 2015), so too is the hearing impaired population. The median age of the total and bilaterally hearing impaired population is projected to remain relatively constant until 2005, then increase from 59.1 in 2005 to 61.1 by 2015.

3. The absolute number of hearing impaired elderly people is projected to increase from 7.7 million in 1985, to 9.9 million by 2000, and to 12.6 million by 2015.

4. The absolute number of bilaterally hearing impaired elderly people is projected to increase from 5.0 million in 1985, to 6.3 million by 2000, and to 8.1 million by 2015.

Percentages of People by Their Reported Ability to Hear a Normal Conversation, by Age, United States, 1984




Source: United States Bureau of the Census, Current Population Reports, Household Economic Studies, Series P–70, No. 8, Table 2.

# Culture and Communication Studies Program

*Carol J. Erting, Director*

*Faculty/Staff:*
*Maureen O. Hynes*
*Carlene T. Prezioso*
*Rachel Stone-Harris*
*James Woodward*

The Culture and Communication Studies Program (CCSP) is one of three new units established by the Gallaudet Research Institute during the past year. Researchers in the CCSP are analyzing and comparing the processes involved in acquiring language and forming cultural identities in the United States and other countries, particularly among deaf people. Data concerning linguistic and cultural acquisition processes that were collected by other GRI units prior to academic year 1987-88 are in some cases being analyzed within the new program. One project, for instance, involves the ongoing analysis of data gathered in a 1985 Center for Assessment and Demographic Studies survey concerning the communication practices of teachers instructing hearing impaired students in residential, day, and local schools throughout the United States. Data on early language acquisition by deaf infants of deaf parents initially collected by CCSP investigators, then in the GRI's Center for Studies in Education and Human Development, will also be further analyzed.

*Carol J. Erting*

A major focus of the CCSP's research staff will be cross-cultural studies, presently involving such countries as Spain, Italy, Mexico, and several countries in Central and South America , but eventually involving many more. In a cooperative effort with investigators from Spain, they are now studying the impact of integrated or "mainstreamed" educational programs on deaf students in that country and in the United States. In an even farther-reaching project, researchers in the CCSP are planning many aspects of the international "Deaf Way" conference/festival to be held at Gallaudet in July, 1989. This conference/festival will feature presentations concerning the cultural and linguistic accomplishments of deaf people in many nations.

# A Study of Communication Patterns in Classrooms Throughout the United States

*GRI Investigators:*
*James Woodward*
*Thomas E. Allen*
*Arthur N. Schildroth*
*Michael A. Karchmer*

*Project Duration:*
*May, 1985 to present*

The purpose of this ongoing study has been to describe the communication patterns used by teachers while instructing hearing impaired students. More specifically, we have been trying to determine whether teachers prefer to use American Sign Language (ASL) or English for instruction. For those who do prefer English, we have been analyzing whether they normally represent the language orally, manually, or through simultaneous communication.

We first selected 4,500 students at random from the more than 50,000 names gathered by CADS' Annual Survey of Hearing Impaired Children and Youth, then sent questionnaires to these students' educational programs (from preschool through high school levels, including residential, day, and local schools). Using guidelines from CADS, the program administrators distributed the questionnaires to teachers in such a way that teachers' communication practices in reading, mathematics, and social studies classes would all be well-represented in the resulting data base.

Our questionnaire was designed to elicit a variety of information concerning the communication patterns teachers were using in the classroom. Some questions focused on the language base of the teachers' normal communication during instruction, that is, English or ASL. Other questions focused on the "channel" used to present that language, in other words, oral, manual, or simultaneous communication. For teachers who signed, we asked several additional questions to determine where the teachers fit along the ASL to English continuum. We asked teachers directly what they called the type of signing they used. Also, we asked other specific questions about how teachers would sign two sample sentences in the classroom.

During the 1987-88 academic year, we performed three new analyses of the data.

In one analysis, we examined the classroom use of artificial sign systems designed to represent English. In this study, 59% of the teachers who signed claimed to be using one of the four major artificial sign systems designed to represent English: SEE I (3%), SEE II (25%), LOVE (< 1%), or Signed English (31%). However, when we examined other responses given by these teachers, it became difficult to accept many of the teachers' answers at face value. Teachers made three major types of violations of the principles of these sign systems: using inappropriate sign vocabulary, omitting English morphemes, and using fingerspelling where an artificial sign was available. The majority of teachers claiming to use these systems (66%) indicated elsewhere on the questionnaire that they did not use appropriate sign vocabulary for these systems. Almost half the teachers claiming to use these systems (47%) reported omitting English morphemes and one fifth (20%) reported using fingerspelling where an artificial sign was available. In our final analysis of the responses, we found that only 12.3% of the signing teachers were actually using one of the four major

artificial sign systems designed to represent English: SEE I (1%), SEE II (8%), LOVE (0%), Signed English (4%).

In our second analysis we examined the grammatical structure of teachers' signing and concluded that almost half the signing teachers surveyed (49%) demonstrated through their responses to the survey that they were actually using grammatical characteristics typical of Sign English (i.e., Pidgin Sign English). Of the teachers who appeared to be using such signing, a little more than half indicated they were manually representing all English content and function words (54%). One sixth of these teachers (17%) reported manually representing all English content words and some (but not all) English function words, while one fifth (20%) reported representing all English content words and no English function words. Ten percent of these teachers reported representing some (but not all) English content words and no English function words. Deaf teachers proved most likely to report signing with grammatical characteristics typical of Sign English; hard of hearing teachers proved less likely to report this and hearing teachers proved to be the least likely to report this. The hearing teachers most likely to report signing with grammatical characteristics typical of Sign English tended to have the following characteristics: teaching in a residential school, teaching in a high school or at an ungraded level, teaching in the Northeastern region of the United States, having less than ten years experience teaching hearing impaired students, reporting a lot of social interaction with deaf adults.

In the third analysis we shifted our attention to the students, asking the general questions, "what percentage of deaf students are receiving which types of communication in the classroom?" and "what student characteristics are associated with receiving various communication modes in the classroom?" Our major finding was that program differences in the prevalence of different modes of communication could be explained by student characteristics, most notably, the levels of the students' hearing losses and the reported degrees of the students' speech intelligibility. For example, while 35% of our total sample of hearing impaired students used oral communication in the classroom, there were marked differences for students with different levels of hearing loss. Only 11% of the students with profound loss were reportedly using oral communication in the classroom, while 78% of the students with less than severe losses were reportedly using an oral communication mode.

In another part of this third analysis, we looked at qualitative aspects of the sign communication performed by teachers in the classroom. The survey had asked teachers to report where they learned to sign, how proficient they rated themselves as signers, how much of their social interaction was with deaf adults, and the degree to which they incorporated English features into their signing. The results indicated that students in residential schools had teachers who were more likely than the teachers of local school students to have acquired their signing skills from other deaf adults, as opposed to from sign language classes; residential school teachers were also more likely than local school teachers to report frequent interaction with other deaf adults and were more likely to rate their signing skills as being proficient. On the other hand, students in the local regular schools were more likely to have teachers who incorporated more English features into their signing. We have consequently concluded that qualitative aspects of the sign communication experienced by students in residential schools differ markedly from those experienced by students in local public schools.

# United States/Spain Joint Seminars and Exchange Visits: "Deaf Children in Integrated Educational Settings"

*GRI Investigators:*
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*Thomas Allen*

***Collaborating Faculty/Staff:***
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*Pre-College Programs*

***External Collaborators:***
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*Ministry of Education, Spain*
*Mariam Valmaseda,*
*Pilar Alonso,*
*Esther Diaz-Estebenez,*
*Araceli Fernandez,*
*Gerardo Echeita, and*
*Elena Martin*
*National Resource Center for Special Education, Madrid, Spain*

***Extramural Funding:***
*Joint Committee for North America, Spanish Educational and Cultural Cooperation*
*$20,000*

***Project Duration:***
*April, 1988 to June, 1989*

Funding of this one-year grant is enabling research teams from United States and Spanish institutions to meet on four occasions to begin preliminary planning for future collaborative study of deaf children in mainstream settings.

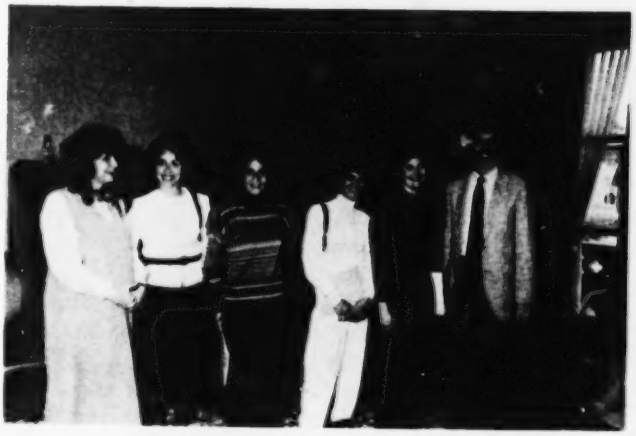
The first two exchange visits were completed during academic year 1987-88. Four members of the Spanish research team from the National Resource Center for Special Education, Madrid, Spain, visited Gallaudet University in April, 1988. During their four days in the Washington area they toured the Gallaudet campus, visited local schools with mainstream programs in Fairfax County, Virginia, and visited the Maryland School for the Deaf, Columbia campus.

One day was devoted to a series of presentations and discussions aimed at fostering greater understanding of mainstreaming in the two countries. The Gallaudet team addressed such topics as (1) the demographics of deaf education in the United States, (2) the political, cultural, and ideological context of mainstreaming since the passage of PL 94-142, (3) the importance of deaf adult role models in mainstream settings, and (4) issues related to interpreting in mainstream settings. The Spanish team described the integration project which began there in 1985 and discussed one aspect of their research in which they are using ethnographic methods to investigate classroom interaction of children and teachers.

Four members of the Culture and Communication Studies Program went to Madrid for the second exchange visit in June, 1988. We met with members of the Spanish research team at the National Resource Center for Special Education, visited a school participating in the integration (mainstream) project, and toured an oral school for deaf children and an infant school where two deaf children are main-streamed. We also met with the president of the Confederation of Spanish Deaf Associations and visited one of the three deaf associations in Madrid.

Again, both teams made formal presentations. The Spanish team described (1) the evaluation research currently underway on the integration project, (2) integration in early intervention programs, and (3) the social interaction and social development of deaf children in integrated settings. We presented an overview of deaf education in the U.S. since PL 94-142 and discussed the importance of deaf community involvement in educational programs for deaf children.

The next two exchange visits will occur in 1988-89 and will be for the purpose of research planning, with the goal of producing collaborative research on deaf children in mainstream settings in the two countries, as well as two publications, one in Spanish and one in English, based on the seminar presentations.



*Some of the members of the U.S. and Spanish teams meet with Dr. I. King Jordan, President of Gallaudet University.*

# The Deaf Way: An International Festival and Conference on the Language, Culture, and History of Deaf People

*GRI Investigators:*
*Carol J. Erting*
*Carlene T. Prezioso*
*Michael A. Karchmer*
*Maureen O'Grady Hynes*
*Ellie Korres*
*Natalaie Tate*
*Alex Quaynor*

*Collaborating Faculty/Staff:*
*Numerous faculty and staff from all divisions of the university*

*External Collaborators:*
*The Deaf Way has an honorary board of more than 50 well-known deaf and hearing individuals*

*Project Duration:*
*Nov., 1986 to July, 1989*

During the past year, we have been actively involved in planning "The Deaf Way," an international festival and conference scheduled to occur in Washington, DC, in July, 1989. "The Deaf Way" is an event to celebrate, demonstrate, and discuss the deaf way of life, with special focus on the language, culture, history, and creative expression of deaf communities. It is to be an event primarily for, by, and about deaf people, that will examine what deaf people have accomplished, what they create, how they live their lives, and what they value.

Although "The Deaf Way" is being planned and carried out primarily by deaf people, it will bring together both deaf and hearing participants for a week of immersion in the languages and cultures of deaf communities from around the world. A major goal of this international meeting is to provide an opportunity for deaf individuals to become aware of and experience their own heritage as well as for hearing people to be introduced to aspects of deaf peoples' lives they may rarely have an opportunity to experience. The emphasis of "The Deaf Way" will be on culture and communication, expressed through language, art, and shared experiences.

"The Deaf Way" has several goals: (1) to bring together both deaf and hearing scholars and professionals, interweaving analytical perspectives and participatory experiences so that both those familiar with the deaf experience as well as those new to it have an opportunity to participate in and observe the others' world; (2) to examine data accumulated by researchers who have looked at deaf communities from a cross-cultural perspective, and to assess current needs and plan future directions for research and action; (3) to stimulate and encourage deaf community members themselves to become familiar with and begin to use social science perspectives and methodologies to study their own histories, cultures, and languages, and to use that knowledge to work toward improving the quality of life for deaf people in their countries; (4) to establish cross-cultural research and action networks; (5) to produce cultural, linguistic, historical, and artistic video archives for use in future research on deaf communities as well as for preserving the cultural and linguistic resources of these communities; (6) to disseminate written and videotaped conference proceedings to a wide audience including scholars, deaf communities, service providers, families with deaf children, and other individuals and institutions who interact with and make decisions affecting deaf people; and (7) to develop recommendations for future activities in such fields as research, program development, and policy planning as we move into the twenty-first century.

*For more information about*

*The Deaf Way*

*an International Festival and Conference on the Language, Culture, and History of Deaf People*

contact:

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# Center for Studies in Education and Human Development

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*Students:*
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*Vicki Trimm*

The Center for Studies in Education and Human Development (CSEHD) was established in 1981 within the Gallaudet Research Institute with the mission of conducting research of demonstrable benefit to deaf children and their families. It was constituted from previously existing applied research units in child development, educational research, mental health, and Signed English.

CSEHD research activities are pragmatic, programmatic, and longitudinal in nature. The CSEHD's collaborative programs of research entail cooperative, multi-disciplinary efforts by investigators drawn from several fields, including child development, education, psychology, and sociology. Research is conducted not only in cooperation with other units in the GRI and other Gallaudet researchers, but with colleagues throughout the nation and world.

There are several research programs currently underway at the CSEHD. Scientists in the infancy program are examining how deafness affects parent-infant interaction and the earliest stages of language development. The literacy program combines the talents of a number of CSEHD researchers and researchers outside the GRI in examining the exact nature of deaf people's reading and writing processes and in tracing the effects of home and school environments on deaf children's developing literacy skills. Researchers in the secondary education program are working closely with many high schools around the country to examine such matters as the effects of mainstreaming on deaf children's education.

*Donald F. Moores*

# Parent-Infant Interaction

***GRI Investigators:***
*Kathryn P. Meadow-Orlans*
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*Leslie Davis*
*Pat Spencer Day*
*David Deyo*
*Carol J. Erting*
*Robert H. MacTurk*
*Maureen O'Grady Hynes*
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*Natalie Tate*
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*Mary June Moseley*
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***External Collaborators:***
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*Univ. of Pittsburgh*
*Mary Gutfreund*
*Univ. of Bristol*
*England*
*Edward Tronick*
*Univ. of Massachusetts*

***Beltone Scholar:***
*Andrew Gianino*
*University of Massachusetts*
*with extramural funding*
*from the Beltone Institute*
*for Hearing Research*
*$15,000*

***Project Duration:***
*Oct., 1983 to Sept., 1990*

In this project, now entering its sixth year, we are studying the effects of deafness on the interactions of infants with their primary caregivers. Because so many researchers and practitioners concerned with child development have concluded that there are significant effects on social, emotional, linguistic, and intellectual development resulting from infants' early interactions, the findings of this project are likely to prove especially important to parents who either are deaf or have deaf children.

One aim of the project has been to determine how parent-infant interactions affected by deafness compare to those of hearing infants with hearing parents, as previously examined in the pioneering research of Berry Brazelton and Edward Tronick. Several of our analyses have consequently employed Brazelton and Tronick's "monadic phase" coding system to examine, frame-by-frame, the videotaped interactions of deaf and hearing mothers with hearing and deaf infants.

During the first three years of the project, we concentrated on collecting more than 200 split-screen videotapes showing the simultaneous behaviors of infants younger than twelve months of age and their mothers. For the past two years we have been conducting microanalyses of those videotapes, collecting new videotapes only when additional numbers of subjects were needed to better represent particular groups or if data were needed on the interactions of some of the infants at a later age. (To gather needed data on language development, for example, we videotaped a sub-group of infants again at the age of 24 months.)

Examples of age and group composition, coding systems, and brief summaries of our findings follow:

1) Compared to hearing infants with hearing mothers, hard of hearing infants with hearing mothers (ages 10, 11, and 12 months) exhibited

*Beltone Scholar, Andrew Gianino, and Kathryn P. Meadow-Orlans observe a split-screen videotape of a mother interacting with her infant.*

greater levels of protest behaviors, according to our monadic phase coding analysis. These infants were found to be more likely to cry during both the periods of "normal" interaction and the "stillface" periods in which the mothers were asked to maintain neutral facial expression, to remain silent, and to refrain from touching their infants. These infants also seemed more difficult to calm once normal interaction resumed. Based on a coding system developed by a GRI investigator, we concluded that hearing mothers of hard of hearing infants were more likely to lead or dominate interactions with the infants, as shown by their tendencies to re-direct the infants' attention and continue their own conversational topics when the infants looked away.

2) Data based on analysis of the facial expressions of 9-month-old deaf and hearing infants with deaf mothers, when compared with data on hearing infants of hearing mothers, suggested that there is less "synchrony" (which could be roughly defined as mutual satisfaction or harmony) in the interactions of pairs that include deaf mothers. However, it seemed that facial expression might not be the best measure of synchrony for these pairs, because the deaf mothers tended to use facial expression for linguistic as well as emotive purposes. Consequently, we are now engaged in a second coding effort, using the "AFFEX" system developed by Carroll Izard. The special focus of this analysis is on how the infants' expression of emotion shifted from "normal" to "stressed," then back to "normal," during interactions with their mothers. Results so far indicate that deaf infants with deaf mothers were more likely to decrease the facial expression of elation or joy during the stillface segment, and to recover former positive facial expression more slowly than the two other groups, once normal interaction resumed.

3) The behaviors of six-month-old deaf and hearing infants with deaf mothers were compared with the behaviors of hearing infants with hearing mothers during the stillface episode. Deaf infants with deaf mothers appeared to experience the greatest discomfort during this period, and they used fewer positive coping mechanisms in dealing with their discomfort.

4) Analyses of characteristics of sign language used by the deaf mothers with their infants and with other deaf adults revealed six "baby talk variants" in their signing as used with infants from 5 to 23 weeks of age.

# Interaction and Support: Mothers and Deaf Infants


***GRI Investigators:***
*Kathryn P. Meadow-Orlans*
*Pat Spencer Day*
*David Deyo*
*Robert H. MacTurk*
*Natalie Tate*

***External Collaborators:***
*Jeffrey Cohn, Shelly Ross, and Sally Popper*
*Univ. of Pittsburgh*
*Edward Tronick and Karen Nelson*
*Univ. of Massachusetts (Amherst)*
*Amy Lederberg, Cynthia McIntyre, Vicki Everhart, and Mary McNorton*
*Univ. of Texas (Dallas)*
*Lauren Adamson, Roger Bakeman, and Diane Slocumb*
*Georgia State Univ.*



***Extramural Funding:***
*Division of Maternal and Child Health and Resources Development Department of Health and Human Services*
*$448,201*

***Project Duration:***
*Oct., 1987 to Sept., 1990*


In this project we are investigating the impact of deafness on the interactions of deaf infants and their normally-hearing mothers during the infants' first year. We are looking for possible correlations between aspects of these interactions and the infants' ability to engage the physical environment, cope with stress during interactions, and communicate with others. Information about each family's response to the diagnosis of deafness and success at finding needed support is also being incorporated into our analysis.

We are studying 40 mother-infant dyads (pairs). Twenty of the infants have normal hearing and 20 are hearing impaired. All 40 of the mothers have normal hearing. At 6 and 9 months of age, we will videotape the dyads using the face-to-face interaction format developed by Edward Tronick and his colleagues. (See also the "Parent-Infant Interaction" project summary on page __ of this report.) This format includes a period of "normal" play interaction, followed by two minutes of "stillface," during which the mothers are asked to maintain neutral facial expression, to remain silent, and to refrain from touching their infants. The stillface sequence provides a situation in which infants' strategies for coping with stress can be observed.

When the infants are 12 months of age, we will further examine their abilities to cope with stress through an analysis of their responses to the "Ainsworth Strange Situation." Free play of mother and child at 9 and 12 months will also be analyzed to assess the mothers' functional use of language and the infants' initiations and responses. At all three ages (6, 9, and 12 months), the infants' mastery motivation will be assessed using procedures developed by Leon Yarrow and colleagues.

*"Information about each family's response to the diagnosis of deafness and success at finding support is also being incorporated into our analysis."*

At each data collection point, we will gather current information on the degrees of stress and external support experienced by the participating families, interviewing the mothers each time to collect up-to-date demographic data, medical histories, and (for hearing impaired infants) diagnostic information.

In addition to the low incidence of early profound deafness, problems in the early diagnosis of hearing loss have made the recruitment of infant research subjects very difficult. Fortunately, extramural funding has made it possible for us to enlarge the scope of our search beyond Washington, D.C. and vicinity by enlisting the collaboration of infant research specialists in four other metropolitan areas, thus increasing our ability to recruit sufficient numbers of subjects. Subcontracts have been negotiated with the University of Pittsburgh, University of Massachusetts (Amherst), University of Texas (Dallas), and Georgia State University.

As a result of internal Gallaudet funding, we will collect comparable data for comparative purposes on deaf mothers with deaf and with hearing infants.

We anticipate that the findings from this project will be useful to behavioral scientists interested in the effects of deafness on early child development and that they will also provide a knowledge base vital for successful intervention programs affecting deaf infants and their parents.

# Symbolic Play Behaviors of Hearing Impaired Toddlers: A Pilot Study

*GRI Investigators:*
*Pat Spencer Day*
*Kathryn P. Meadow-Orlans*
*David Deyo*
*Natalie Tate*

*External Collaborators:*
*Lorraine McCune*
*Rutgers Univ.*

*Project Duration:*
*May, 1988 to Nov., 1989*

In this study we are attempting to gather information from a varied sample of hearing impaired children about the effects of deafness on symbolic functioning in both play and language development. We hope, among other things, that this information will help answer some questions about the nature of a previously observed strong relationship between language acquisition and symbolic play development among normally-developing hearing children.

Researchers who have reported on this strong relationship have also commented on an apparent association between delayed symbolic play development and delayed acquisition of expressive language skills among some otherwise normally-developing hearing children. What has remained unclear, however, is whether this delay in play behavior is a consequence of decreased opportunities for social interaction due to the delayed language or, instead, is another symptom of an underlying deficit in central neurologic processing that is affecting the children's symbolic abilities in general.

It occurred to us that because environmental factors so often play an important role in hearing impaired children's language development, symbolic play behaviors might be less strongly associated with language development among these children than among normally-developing hearing children. Whether or not this would prove to be the case, we assumed that an examination of this relationship among hearing impaired subjects would also shed light on the general nature of the relationship between the two developmental areas.

Hearing impaired children comprise a group with widely varying language skills. Language delay among these children is often due to the environmentally imposed deprivation of decipherable language models rather than to difficulties in central neurological processing. In other words, even if these children's intelligence is fully intact, if language is not presented to them in a form their hearing loss allows them to perceive, they may experience delayed language development. If the delays in symbolic play found for hearing children with specific language delay is in fact due to limitations imposed by their decreased language skills, deaf children with environmentally-imposed language delays should show similarly delayed play behaviors. If the previously observed relationship between delayed play and delayed language has been due to a central deficit affecting both domains, however, deaf children's play should proceed as expected for their age, regardless of their rate of language development.

In a pilot study, now underway, we are investigating the symbolic play behaviors of 20 two-year-old hearing impaired children. Children with both deaf and hearing parents have been included to ensure heterogeneity in language development. We are using the "Communication" scale of the Alpern-Boll Developmental Profile II to measure language levels. To ensure that the subjects are developing normally in non-verbal domains, we are also administering the "Physical" and "Self-Help" scales of that instrument.

So far, 10 of the subjects have been videotaped, and we have begun to gather data from these tapes. We are measuring, among other things, the amount of time spent in symbolic play activities, the duration of specific symbolic play units, and the levels of symbolic play achieved. To facilitate our analysis of these measures, three members of our investigative team have received training in coding procedures developed by Lorraine McCune.

*Examining deaf children's symbolic play behavior may shed new light on the relationship between language development and symbolic functioning in general.*

# A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children


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This was the fourth and final year of a longitudinal study designed to identify factors or combinations of factors that facilitate or impede deaf children's progress towards literacy. We tracked 30 children from age 3 to a point at which many of them, by conventional standards, have become "independent readers." Our ultimate goal has been to develop a model for the optimal development of literacy among hearing impaired children and to make recommendations to parents and teachers about how to create highly facilitative learning environments.

A variety of data-collection techniques were used to examine developmental, demographic, cognitive, and linguistic factors pertaining to reading and writing development in hearing impaired students. These techniques included classroom observations; interviews of parents, teachers, and school personnel; videotapes of children reading and/or retelling stories. We further noted environmental influences on the children in written narratives describing the children's neighborhood and school settings, and we have analyzed the educational philosophies, reading and writing curricula, and internal organizations of each of the participating school programs.

Individual testing of the students was conducted with instruments designed to tap the students' concept of story, awareness of environmental print, book-handling behavior, and reading and writing proficiency. Language and play scales, as well, contributed to the total picture of each child and group of children learning to become literate.

The seventeen instruments/activities comprising the literacy study database have yielded a wealth of qualitative and quantitative information over the past four years. Ten of these instruments/activities have been augmented by data from outside researchers.

Earlier studies have indicated that reading stories to children and discussing them in a way that encourages reflection upon their own experiences, combined with the imaginative exploration of the world created by a text, appears to be an extremely powerful method of helping children become proficient readers and writers. For this reason, the 100 parent book-sharing sessions videotaped during the course of this study have been of special interest to all the cooperating researchers.

Our initial analysis indicates that some parents have devised unique strategies for facilitating the involvement in, and understanding of, stories by their children. These include the use of touch, eyegaze, signing on pages, and flexibility and variation of communication modes. Beyond these, we have identified another fourteen maternal strategies for directing the child's attention toward a better understanding of a text. A comparison of book-sharing strategies used by hearing parents of deaf children, deaf parents of deaf children, and hearing parents of hearing children (as described in the literature) will provide further insights into this most important of literacy activities.

We found that as teachers read to their hearing impaired students they communicate many specific types of messages about the pleasure and importance of books and the way books work. To date, 49 classroom book-sharings involving 31 teachers have been videotaped. Analysis of 10 of these tapes revealed that certain teacher behaviors such as type of eyegaze (on individuals or on groups); predetermination of correct responses from the children; and the inviting of prediction from the children, had the effect of encouraging or discouraging student participation in the book-sharing. Furthermore, the clarity of the teachers' messages, their use of props, their choice of books, and their level of dominance in the book-sharing event also affected the range and rate of student interaction. Once again, cooperating researchers have shown an interest in studying this previously unexplored activity in depth. Numerous papers and presentations have resulted from analyses of the videotapes.

We have devised coding schemes for all of the test instruments/activities, are analyzing the data, and expect to complete a final report in 1989.

# Factors Predictive of Academic Achievement in Deaf Adolescents


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***Extramural Funding:***
*National Institutes of Health*
*National Institute of Neurological and Communicative Disorders and Stroke*
*$673,000*

***Project Duration:***
*Sept., 1984 to Oct., 1987*


This year we completed the final phase of a three-year project designed to determine what factors in deaf teenagers' backgrounds and environments are most important in bringing about various achievement levels in reading and writing. The project, supported by funding from the National Institutes of Health, focused on identifying factors predictive of reading abilities in two distinct groups of deaf adolescents, each of which consists of students who have been in total communication programs since preschool: (1) those who have hearing parents and (2) those with deaf parents.

The study consisted of three phases. In Phase One we identified, adapted, or developed appropriate tests for obtaining measures in reading, writing, person-to-person communication (oral, simultaneous communication, and American Sign Language [ASL]), cognition and intelligence, speech and hearing, and personality. Prior to this study, few tests existed that could reliably assess deaf students' capabilities in most of these areas. Consequently, this initial phase of the study required considerable attention.

For assessing writing ability, we adapted procedures from the writing assessment section of the Educational Testing Service's "National Assessment of Educational Progress." New procedures were developed for evaluating students' videotaped retellings of stories to measure reading comprehension among students who are fluent signers. Language proficiency interview procedures were also designed for measuring capability in the following modes of person-to-person communication: ASL, oral communication, and simultaneous communication.

We developed tests for assessing deaf adolescents' "world knowledge" rather than IQ as a reliable indication of general intelligence and adapted hearing measures for our high school aged subjects that had been developed for college students by Gallaudet's Audiology Department.

In Phase Two, we administered a 13-hour pilot test battery to 20 deaf teenagers who had been in total communication programs. Ten of the teenagers had deaf parents and 10 had hearing parents. The subjects were students at Gallaudet's Model Secondary School for the Deaf (MSSD) and at the Maryland School for the Deaf. After analyzing results of the pilot testing, we developed a final, 10-hour battery.

In Phase Three, we administered the newly developed or adapted tests to 65 subjects from each of the two groups of students, recruiting subjects from the following schools:

California School for the Deaf, Fremont
California School for the Deaf, Riverside
Illinois School for the Deaf
Indiana School for the Deaf
Maryland School for the Deaf
Model Secondary School for the Deaf (at Gallaudet)
Texas School for the Deaf

Two subjects were enrolled at Gallaudet University. During the testing period Gallaudet enrolled 23 deaf students under 18 years of age who had deaf parents. Because the purpose of the study was to analyze a range of school achievement and not concentrate only on high achieving students, participation of Gallaudet students was kept to a minimum.

We analyzed the results and submitted a final report to the funding agency, the National Institute of Neurological and Communicative Disorders and Stroke.

Because of the great differences in the background characteristics of the subjects in the two groups in terms of socio-economic status, ethnicity, and other variables, we analyzed the data from the two groups separately. The patterns of the results, concerning

factors predictive of reading and writing skills, proved to be quite complex but similar for each group. The principle investigator, Donald F. Moores, will devote a portion of 1989 to writing in greater detail about the apparent significance of these patterns.

Our preliminary results indicate that among deaf adolescents with deaf parents tests of hearing, speech production, and person-to-person communication through oral, English-based signing, or ASL modes were not highly correlated with reading and writing abilities. The highest correlations were with verbal subtests of the WAIS (Wechsler Adult Intelligence Scale) and two tests of English grammar, suggesting that English grammar and English language skills are of primary importance to reading and writing among deaf adolescents with deaf parents. We obtained similar results for deaf adolescents with hearing parents, although our analyses accounted for different percentages of the variances for reading and writing than were found for the deaf adolescents with deaf parents.

Over the next year, factors predicting achievement with each group will be further investigated, with particular attention to the apparent lack of prediction provided by measures of hearing or of English-based signing, ASL, or oral fluency.

# Preparations for Conducting a Program of Literacy Research

*GRI Investigators:*
*Leonard P. Kelly*
*Karen Saulnier*
*Linda Stamper*
*Maureen Hartman*

*Project Duration:*
*Dec., 1987 to present*

This year, we developed both a policy statement for guiding a long-range program of research intended to contribute to deaf people's literacy and the computerized technology required for conducting the research. The program's most basic premise is that readers and writers normally process multiple sources of information as they read or write, a theory that has huge implications for research intended to serve deaf people. Readers and writers synthesize textual features, commonly called "constraints," into either a meaning constructed and stored in memory while reading or the production of a specific word, phrase, or sentence when writing. Our comprehension of a text depends on a composite of our familiarity with such textual features as the topic, the author's choice of words and style, even our knowledge of English spelling conventions. When writing, we must satisfy constraints like grammar, organization, completeness, and the characteristics of our audience. There are times when superior processing of one constraint can partly compensate for the deficient processing of others.

During reading and writing, the separate sources of information are processed in "working memory," that limited-capacity region of the mind that briefly holds such information as telephone numbers we are about to dial. Effective reading and writing thus require processing of textual constraints that is reasonably swift as well as accurate. Considering the reading and writing problems of many deaf people, we may conclude that many of these individuals either have inadequate knowledge of certain textual constraints or are unable to apply their knowledge with sufficient automaticity. However, the superior literacy skills of some deaf people suggest that they are processing selected constraints with exceptional effectiveness.

The preceding view of reading and writing processes guides the present program of research in several ways: it urges measurement of literacy processes as well as literacy outcomes; it calls for research designs and analyses that isolate the effects of individual textual constraints; it has the potential to stimulate an exhaustive array of important research questions; and it unifies the study of reading and writing.

We anticipate that at least a portion of the research program will consist of a series of controlled experiments during which subjects will either read a text, compose it, or respond to questions about a text.

Consistent with the tactics used in studies of hearing subjects, text processing will be computerized. In a reading application, subjects will present specially designed texts to themselves in specified increments as the computer documents how long each segment is kept in view. In certain experiments, we will time and record subjects' responses to intermittent questions that appear. In an analogous writing experiment, the computer will record text as it is composed, and it will document the lapse of time between each keystroke.

If we control the experimental conditions properly, we should be able to combine pause times or viewing times with subject responses in order to infer the mental processes that generated the overt behavior. Moreover, by recording "on line" behavior in experiments such as these, we should be able to measure the knowledge of textual constraints accessible to working memory under normal reading and writing conditions.

One planned project will identify specific competencies that contribute significantly to exceptionally skillful reading and writing by a certain minority of deaf people. In this project, we will record reading and writing processing behaviors in a series of controlled experiments with specially chosen deaf subjects. Using these data, we will draw contrasts between the literacy processes of average deaf readers and writers and the processes of superior deaf readers and writers. Such contrasts should reveal which processes make important contributions to exceptional performance. These may include application of superior world knowledge, knowledge of word meanings, or metacognitive strategies. Identification of important sub-processes will make it more feasible for us to devise ways of helping that vast majority of prelingually deaf people who have difficulty reading and writing English.

# Application of a Process-Oriented Writing Program for Hearing Impaired Children in Public Schools

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*Anne Marie Baer*

*Extramural Funding:*
*Dept. of Education*
*Office of Special Education and Rehabilitative Services*
*$360,515*

*Project Duration:*
*June, 1987 to Nov., 1989*

This is a two-and-one-half-year, quasi-experimental study of the implementation of a process-oriented writing program in ten public school districts around the United States.

Overall, 325 students are involved in the program. Each year of the project begins with a training period for teachers, followed by an observation phase to ensure that the training has been effective and a data-collection phase to assess short-term effects of the intervention. At the end of the second year we will conduct an assessment of the effectiveness of the program.

Teacher training was conducted in October 1987 at three two-day workshops at Gallaudet and in three one-day refresher meetings held during on-site visits with groups of previously trained teachers. Much of the training in the first year consisted of orienting teachers to a view of writing as a process rather than merely a product. We urged the teachers to stimulate students' written production by adopting a non-judgmental approach to journal entries.

Dialogue journals shared weekly between hearing impaired and hearing partners were started during the second half of this year. This "dual diary" system encourages verbal production, offers a standard English language model for the hearing impaired student, and begins to encourage a sense of audience in the young hearing impaired writer. We collected data to help interpret the process involved in the selection of participating students and to provide teachers with information useful for motivating their students to write to each other. At the end of the first year, we administered a small Likert-scaled questionnaire to the students to measure their attitudes toward the dual diary writing process.

*"Much of our training in the first year consisted of orienting teachers to a view of writing as a process rather than merely a product."*

Using a discourse analysis approach, we are presently coding the dual diaries, by "t-units" for the identity of the writer, the sequence of the entry, the topic of the entry, and the maintenance of the topic across entries. Additional coding will help us determine changes in the grammatical complexity of the entries. Language changes do appear to take place in the writing of the hearing impaired students, but these have not yet been systematically investigated.

It appears that several types of relationships develop between the hearing and the hearing impaired student writers. We hope that analysis of certain aspects of the coding system described above will help us understand more about these relationships. An initial perusal of the diaries suggests that the most common type of resulting relationship is the development of a new friendship between the students that may culminate either in group social events or individual contact between the writers.

As a result of suggestions made by the teachers during follow-up workshops, we are developing procedures that will help other teachers implement a dual-diary program. Some important parameters appear to be the presence of about 30 to 50 hearing impaired students at the same site, good formal and informal relations with the regular class teachers, and physical proximity between the rooms where the diary writing occurs. The "language gap" between the hearing and hearing impaired students appears to be handled in various ways. In some settings, it has not been at all noted; in others, the teachers have encourages students to take a "conversational" approach to resolving misunderstandings.

To monitor the implementation of the curriculum, we asked teachers to complete daily logs of their lessons, using a quarter of the class period as a sampling unit. We also asked the teachers to code various types of writing activities during the lesson. The purpose of this data collection was to provide measures of the relative amount of instructional time devoted to writing instruction.

Using a demographic questionnaire and an attitude-toward-teaching-composition survey, we collected background data on the teachers. So far, only a few preliminary descriptive statistics gathered by these instruments have been computed. We obtained background information on the students through the release of GRI Annual Survey information from the Center for Assessment and Demographic Studies and the most current SAT-HI scores for each of the students.

During the fall of 1987 we collected baseline writing samples. The samples were responses to age-appropriate stimuli developed by the National Assessment of Educational Progress. A descriptive essay, a persuasive essay, and a business letter were collected from each student involved in the study. To date, we have scored the descriptive essays, using a modified NAEP scoring system. (In the modified system, the conventional four-point NAEP scale is expanded into a six-point scale by the inclusion of extra steps at the bottom of the scale. This produces a roughly normal distribution of paper scores as opposed to the NAEP four-point scale which skews the papers at the lower end.)

*"The 'language gap' between the hearing and hearing impaired students appears to be handled in various ways."*

Each of the participating teachers was asked to submit an exemplary lesson idea that presented one of the steps in teaching writing as a process. We have collected these ideas, are editing them, and will publish them this coming year through Gallaudet's Pre-College Programs' Outreach unit.

# National Research to Development Network for Public School Programs for the Hearing Impaired

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*Dept. of Education*

***Project Funding:***
*Presidential Award*
*$49,000*

***Project Duration:***
*July, 1986 to July, 1990*

The purpose of the "National Research to Development Network" is to generate new knowledge about public school programs, to obtain relevant data about a large sample of programs over a relatively long period of time, and to provide direct services to these programs in the form of educational innovations.

The process of developing educational innovations centers around regular and systematic contact with key personnel from the participating school programs. In our research-to-development model, these school personnel define and prioritize their needs, the university research team develops possible solutions, then both groups work together to determine the feasibility of the proposed project. The school districts often support pilot work related to the proposed project while the university research team seeks external funding to support implementation and evaluation on a national level.

One already-implemented result of the research-to-development process is the "Process-Oriented Writing Program," described elsewhere in this report. Several other projects, concerning such topics as the social integration and the career aspirations of hearing impaired students, are now in the development phase.

A key feature of the process is the annual meeting of the administrators of the participating programs. The purposes of this meeting are to give the university research team the opportunity to report on what has been accomplished during the previous year, to allow school personnel to discuss immediate concerns or problems they want future research to address, to permit school personnel to critique the previous year's activities, to provide feedback about present activities, and to allow both groups to negotiate the logistics of future work. Topics for future research discussed at the meeting included the social and emotional adjustment of mainstreamed hearing impaired students and the postsecondary aspirations of hearing impaired students in public schools.

One of the suggestions that came out of this year's meeting was that more information concerning the program be disseminated to involved parents and teachers. Consequently, software has been obtained to support the "desktop publishing" of a regular newsletter to parents and teachers.

# A Longitudinal Study of Three Cohorts of Hearing Impaired Students in Public High School Programs


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***Project Duration:***
*Sept., 1986 to Oct., 1991*

The purpose of this longitudinal study, now entering its third year, is to develop an overview of the typical experiences of hearing impaired students as they progress through public high schools. We are tracking the high school experiences of three age groups (cohorts) of students from 16 different public school programs around the United States and Canada.

Currently, there are 335 students participating in the study; of these, 176 entered the study as freshmen this year. Meadow-Kendall Social-Emotional Adjustment Inventories, writing samples, enrollment histories, and forms for permission to participate were used to gather information about these ninth-graders for our database.

All participating students completed "ACOPE" questionnaires this year and their responses have been entered for data analysis. The ACOPE questionnaire is designed to measure adolescents' ability to cope with new situations. We used it, in part, to test our hypothesis that the hearing impaired students most likely to succeed in public school programs would be those who are highly skilled in dealing with challenging situations. A questionnaire called "FACES," designed to gather information about the students' relationships with their families, was sent to the students' parents this year, along with a questionnaire developed by CSEHD investigators to assess the families' socio-economic status, communication practices, and expectations for the hearing impaired students. To date, 56% of the parents have returned the questionnaires and the data are now being analyzed.

We annually collect course reports on each student. These reports include a list of the classes the student took, the type of placement situation the student was in, and the grades the student received. As most of our efforts so far have been directed toward the identification of the subjects and the collection of raw data, actual data analysis will begin this fall.

*We wondered what hearing impaired students typically experience as they progress through public high school.*

# Dissemination of a Model to Create Least Restrictive Environments for Deaf Students


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***Extramural Funding:***
*National Institutes of Health*
*National Institute of Disability and Rehabilitation Research*
*$491,055*

***Project Duration:***
*Oct., 1987 to Sept., 1990*


In this project, we are attempting to promote the realization of Public Law 94-142's concept of "least restrictive environment" as applied to deaf students. Our approach consists of four interrelated activities:

1. Identify exemplary components of various existing educational programs, noting especially such factors as placement procedures, parental involvement, and the learning "climate" created by schools and teachers, as well as the academic achievements, levels of social involvement, and postsecondary experiences of the hearing impaired students.
2. Develop strategies and guidelines for replication of successful program components.
3. Conduct a validation study in three states while providing technical assistance for the replication of the successful procedures and assisting in the development of a network of cooperative programs.
4. Disseminate the final guidelines and networking strategies on a national basis.

These activities are being conducted on a nationwide basis in two 18-month phases. During the first phase, we are gathering and analyzing a large body of data related to program effectiveness. A complete range of types of programs are participating, so we are looking for successful aspects of residential as well as of public school programs. Because previous experience has shown us that a program that is exemplary in one component may not be exemplary in others, the goal during this phase is not so much to identify commendable programs as commendable components of programs.

We initially established a target of 25 participating programs, but have already obtained cooperation from a total of 34: 8 residential, 2 separate day schools, and 24 local public school programs. These programs represent every geographic area of the United States, which we have divided into the following regions: Northeast, Southeast, Midwest, Southwest, and West.

The enrollment of hearing impaired students in the residential schools ranges from 104 to 455, with a mean enrollment of 257. The local and county school programs represent a much wider range of enrollments of hearing impaired students: from 16 to 341. Nine of these have fewer than 35, eight have from 35 to 100, and seven have 142 or more.

We anticipate that our data collection from the schools will be completed by October, 1988. After successful program components are identified, a set of guidelines will be developed for statewide implementations. Pilot implementations in three states, evaluations of these trial efforts, and the formulation of final recommendations for dissemination of the model will constitute the second phase of the study.

*We are looking for aspects of school programs that "least restrictive environments" for hearing impaired students should include.*

# Problems of Teaching Children with Special Needs: U.S./U.S.S.R. Joint Studies

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*Vadim Egorov*
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*Moscow Institute of Defectology*

***Extramural Funding:***
*The American Council of Learned Society's U.S./U.S.S.R. Commission on Education and the U.S.S.R. Ministry of Education*

***Project Duration:***
*Nov., 1987 to present*

Under the auspices of the International Research Exchange of Scholars, the United States and the Union of Soviet Socialist Republics established in 1987 the basis for joint scholarly relations in education. Seven areas for possible collaboration were identified, one of which was research on the education of exceptional children.

In each of the seven areas, three American and three Soviet scholars were selected to participate on exchange teams. The procedures call for each Soviet team to visit the U.S. to receive an overview and intensive orientation to research in its particular area. Each American team then does the same in the Soviet Union. Following the first round of exchanges, possible future collaborative research efforts and long-term exchanges of researchers will be discussed.

In the area of special needs, Donald Moores was selected to represent research on education of the deaf in the United States. Gallagher, Snell, and Moores organized orientation sessions at the University of North Carolina, the University of Virginia, and Gallaudet University for the three Soviet delegates in January, 1988. The American delegation is scheduled to visit the Moscow Institute of Defectology in September, 1988. Following that visit, possible agendas for future collaboration will be discussed.

*Soviet educators from the Institute of Defectology visited Gallaudet on January 28, 1988. In Gallaudet's Electronic Network for Interaction (ENFI) laboratory are (left to right) ENFI Co-Director Joy Peyton, Interpreter Erika Desbonnet, Scientific Secretary of Research Dr. Yevgenia Martinovskaya, a KDES student, American delegation leader James Gallagher, and Acting Institute Director Dr. Vladimir Lubovsky.*

# Technology Assessment Program

*Judith E. Harkins, Director*

*Faculty/Staff:*
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*Carl J. Jensema*
*Elizabeth Korres*
*Barbara M. Virvan*

Established in 1985, the Technology Assessment Program (TAP) has as its broad purpose to produce information for use by industry, government, and consumers in the area of technology and hearing loss. The ultimate goal of these studies is to improve the availability of appropriate technology for hearing impaired people.

In the two years since the program began, it has been engaged in several projects toward that end. In 1986 it co-sponsored, with the Annenberg School of Communication, Washington Program, a public policy forum on marketplace problems associated with communication technology for disabled persons. The papers commissioned for that forum and published in 1987 provide analyses of various government responses to this problem, as well as present business and consumer concerns.

More recently, the TAP's researchers have been engaged in two opinion studies of disabled persons. The first, an exploratory study of disabled consumers' opinions regarding telecommunications issues, was part of a much larger Joint Telecommunications Research Project sponsored by AT&T and two major consumer associations, the American Association of Retired Persons and the Consumer Federation of America. The second, part of a needs assessment on sensory devices, involved consultation with hearing impaired consumers through the use of focus-groups.

*Judith E. Harkins*

The latter opinion study was part of a two-year research and demonstration project on the process of technology transfer, and what the potential responses from the funding agency, the National Institute on Disability and Rehabilitation Research, might be. The project involves extensive consultation with businesses, consumers, technical experts, and economists, and it attempts to improve the transfer of information among those groups for the purpose of improving the availability of technical devices that make use of a substitute sense.

The program's researchers have also been involved in several informal evaluations of products and services under consideration by businesses. Currently, the staff is working with CompuServe to explore deaf persons' uses of that service and possible new services that might be offered especially for them.

# Technology for Sensory Devices for Deaf and Severely Hard of Hearing People


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*Jeffrey Rubin*
*Bureau of Economic Research, Rutgers Univ.*
*Mark Weiss*
*City Univ. of New York*
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*Tampa, Fla.*



***Extramural Funding:***
*Dept. of Education*
*National Institute on Disability and Rehabilitation Research*
*$299,852*

***Project Duration:***
*Oct., 1986 to Jan., 1989*


In this four-part research and demonstration project we are focusing on a specific subset of sensory devices for hearing impaired people--those that use senses other than hearing. Currently available devices in this category include TDDs, closed caption decoders, and flashing or vibrating systems for alerting people to sound. The scope of the project includes a variety of personal-use devices but excludes instructional and therapeutic applications of technology. The main purposes of the project are (1) to examine consumer, business, and technical arenas and (2) to make recommendations on ways the government can improve research and development efforts in the area of sensory devices.

This past year we completed a needs assessment on sensory devices, the first subtask of the project, and developed and published a report of the consumer-opinion section of the needs assessment study, as well as an updated annotated bibliography related to the issues.

Under the second subtask, we examined the status of certain promising technologies by commissioning technology assessment reports from scientists on both technical obstacles and trends in the business sectors that would affect the development of new technologies. These reports have been completed and are in the process of being reviewed by consumers and technical advisors.

The third part of the project involved examining public and private sources of financing the development of sensory devices other than aids to hearing. During this year economists at Rutgers University, who are collaborating with us on this phase of the project, continued their survey of private sources of funding and began work on a paper synthesizing information on financing issues in technology for disabled people. This segment of the project will be completed later in 1988.

In the fourth subtask, we explored business concerns and investigated the feasibility of influencing manufacturers of general market products to modify those products to make them accessible to deaf and hard of hearing people. Last year we completed 15 interviews with leaders in businesses that manufacture and market devices for deaf and severely hard of hearing people. We also began a demonstration effort aimed at describing the process of working with manufacturers of products for a general market. The problem selected for attention in this demonstration effort was one frequently described by hearing impaired people in the needs assessment phase of the project--the inability to detect the approach of a speeding emergency vehicle. We selected this problem because it is one common to hearing impaired and hearing people alike, because of the insular sound environment created in modern automobiles with air conditioning and radios. The problem was also one that has not been addressed in other research projects, and one for which there is no product currently on the market that effectively addresses the need.

During this past year, our investigators met with a group of emergency services personnel and, with the assistance of an emergency-communications consultant, developed a detailed problem statement outlining common issues in emergency vehicle detection. We shared this information with the National Aeronautics and Space Administration, and several NASA scientists and engineers at both Langley Space Flight Center and Marshall Space Flight Center have agreed to collaborate on technical development aimed at two separate approaches to the problem. This collaboration was made possible with the help of NASA's Center for Technology Utilization, based at the Research Triangle Institute in Raleigh, North Carolina.

# Toward a Videophone for Deaf and Hard of Hearing People--May 26-27, 1988

*GRI Investigator:*
*Judith E. Harkins*
*Carl J. Jensema*

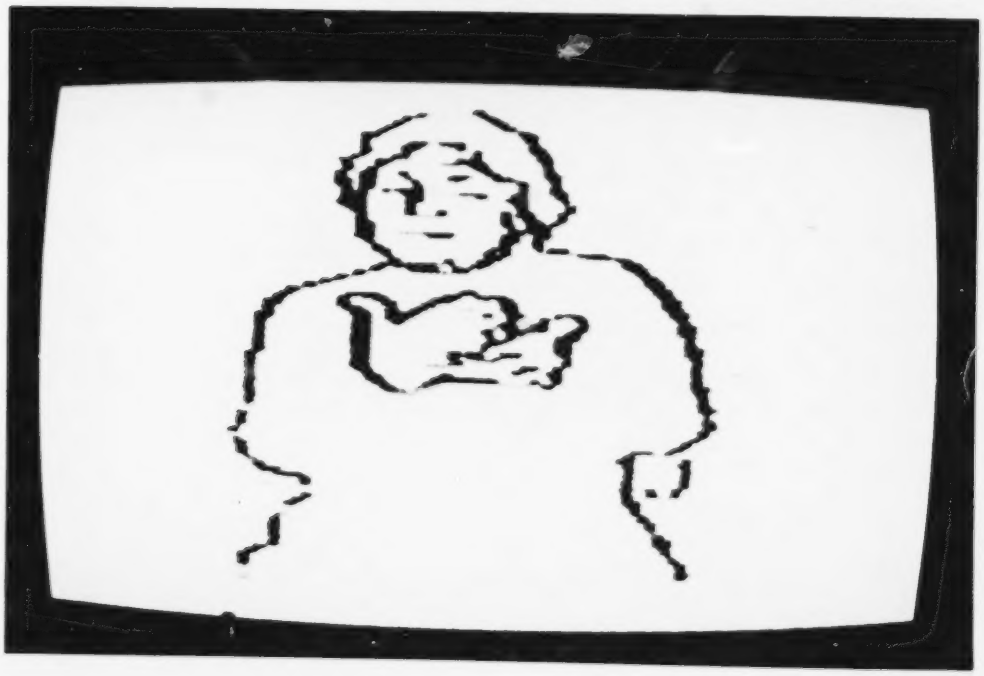
*Extramural Funding:*
*Dept. of Education*
*National Institute on Disability and Rehabilitation Research as part of "Technology for Sensory Devices" Project*

*Project Duration:*
*Dec., 1987 to May, 1988*

During the needs assessment phase of our project, "Technology for Sensory Devices for deaf and severely hard of hearing people" (see page 52), we identified videophone technology as a subject of interest to both deaf and hard of hearing consumers. Responding to this interest, we sponsored a two-day symposium at Gallaudet in May, 1988, on the development of a videophone for deaf and hard of hearing people. By holding the symposium, we hoped to direct attention to this area of research, to encourage collaboration and information-sharing among scientists who have studied the issue, and to develop educated deaf leadership on the technical and business issues surrounding the development of videophone technology.

In theory, videophones would transmit moving images over telephone lines, thus allowing telephone users to see their conversational partners. The central barrier to widespread videophone use is the large bandwidth required for transmission of moving pictures, in contrast to the narrow bandwidth characteristic of the telephone network. The bandwidth is the range between the lowest and highest frequencies that the cable can carry with clarity. Telephones can use a bandwidth between 300-3,000 hertz (cycles per second), while television requires a bandwidth between 0-6,000,000 hertz. The bandwidth requirements for moving pictures can be reduced by slowing the rate at which the images are sent, but this produces choppy, flickering images unsuitable for receptive signing or speechreading.

Overcoming this bandwidth variation has, up to now, been a costly process, with unsatisfactory results. Early market tests of a videophone by AT&T (the "Picturephone") failed, partly because residential and business consumers were unwilling to pay the high costs of such a system. Although scientists expect the data-transmission capacity of telephone transmission to be greatly enhanced by ISDN (Integrated Services Digital Network), which can use either the existing telephone network cable or the new fiber optic cable, it is unknown whether ISDN will be available to residential customers at the



*Images such as that shown at right, created by a computerized, edge-detecting device called "Telesign" (developed by Dr. Morton Nadler of VPI), may eventually allow signers to visually communicate over regular telephone lines.*

low cost telephone subscribers now pay for local service.

The first day of the symposium gave scientists from a variety of organizations the opportunity to discuss with their colleagues some of these technical issues, such as methods of data compression and image processing and the current problems with the intelligibility of signed images. On the second day approximately 60 people from Gallaudet and the Washington, D.C. area attended presentations on the applications of the videophone system, a review of the technical issues involved in its development and use, the future of the telephone network, and future directions for videophone development.

Participants in the first day's scientific symposium were: Don Pearson of the University of Essex, England, George Sperling of New York University, Vivian Tarterr of Rutgers University, Morton Nadler of Virginia Polytechnic Institute, Richard A. Foulds of the DuPont Institute in Wilmington, Delaware, Harry Levitt and Jayrashree Torasker of the Graduate School, City University of New York and Rehabilitation Engineering Center on Hearing Technology, Jan-Ingvar Lindstrom of the Institute for the Handicapped, Sweden, Richard Johnson of the National Institute on Disability and Rehabilitation Research, Alfred Sonnenstrahl of Telecommunications for the Deaf, Inc., and H. Timothy Bunnell, Judith Harkins, Carl. J. Jensema, and James Woodward of the GRI. Randi Friedman of Bell Atlantic also participated in the second day's activities and spoke on the future of the telephone network.

Technical development has reached a point where field trials of a videophone system in England may be feasible within the next year. In Scandinavia and Western Europe, the implementation of ISDN appears to be more imminent than in the United States, and we expect field trials to occur there within the next five years. In the United States, however, there is no current research being conducted in this area of technology for deaf and hard of hearing people.

# Conference: Speech-to-Text: Today and Tomorrow

*GRI Investigators:*
*Judith E. Harkins*
*Carl J. Jensema*

*Extramural Funding:*
*Dept. of Education*
*National Institute on Disability and Rehabilitation Research*
*$49,985*

*Project Duration:*
*Feb., 1988 to Oct. 1988*

During the 1987-88 academic year, considerable TAP staff time was devoted to preparations for a four-day conference on technology and communication access for deaf and hard of hearing people. We will host the conference at Gallaudet in September, 1988. The conference is being presented as part of the TAP's ongoing research and demonstration project, "Technology for sensory devices for deaf and severely hard of hearing people" (see page 52).

Conference participants will present the state-of-the-art in message relay service, real-time captioning, and automatic speech recognition. In addition to lectures and panel discussions, the conference will also provide opportunities for demonstration of current and future methods of converting speech into text.

The 150 to 200 people expected to attend the conference represent consumer groups, telephone companies, captioning companies, businesses in the voice industry, regulatory agencies, legislatures, and professionals interested in communication access for deaf and hard of hearing people.

*Real-time closed captioning is increasingly allowing deaf people to be more fully aware of such things as current events.*

# Alerting Devices for Hearing Impaired People

*GRI Investigators:*
*Judith E. Harkins*
*Carl J. Jensema*

*External Collaborator:*
*Subcontract to the Rehabilitation Engineering Center on Hearing Technology of the Lexington Center, New York, NY*

*Extramural Funding:*
*Dept. of Education*
*National Institute on Disability and Rehabilitation Research*
*$249,785*

*Project Duration:*
*Feb., 1988 to Feb., 1993*

In February, 1988, the Technology Assessment Program began a collaborative project with the Rehabilitation Engineering Center on Disability and Rehabilitation to explore the subject of alerting devices for hearing impaired people. During this five-year project, we will develop user specifications for the technical development of alerting devices, conduct experiments and evaluations of these devices at various stages in their development, and serve as a liaison between businesses and consumers concerned with signalling systems.

We have two main goals for the first year of the project. The first of these is a descriptive study of commercially available devices for alerting deaf and hard of hearing people to certain signals in the environment, such as doorbells, telephones, and alarm clocks. We will also conduct a survey of other products on the market not specifically designed as alerting devices but possibly applicable to this need.

As part of the descriptive study, we are examining currently marketed technology, cataloging information on the devices available, and collecting a sampling of devices for examination and experimentation. We began work on this phase of the project in May, 1988, and presented an overview of signalling devices currently on the market to a consumer group at the SHHH meeting in Rochester, New York, in June, 1988. We expect this phase of the study to be completed by the end of this calendar year.

The second goal of the project will be to develop a state-of-the-art report on sensory devices that specifically use the senses of vision and touch. We will begin this part of the project during academic year 1988-89.

# An Informal Investigation into the Use of CompuServe by Deaf People

*GRI Investigator:*
*Carl J. Jensema*

*External Collaborator:*
*George Menot*
*CompuServe, Inc.*

*Project Duration:*
*July, 1987 to Feb., 1988*

One of the purposes of the Technology Assessment Program is to evaluate the applicability of existing technology to the needs and interests of deaf and hard of hearing people. In one such study, we were asked by CompuServe, a computerized information and communication service, to conduct an informal investigation into deaf people's use and opinions of CompuServe as a communication tool.

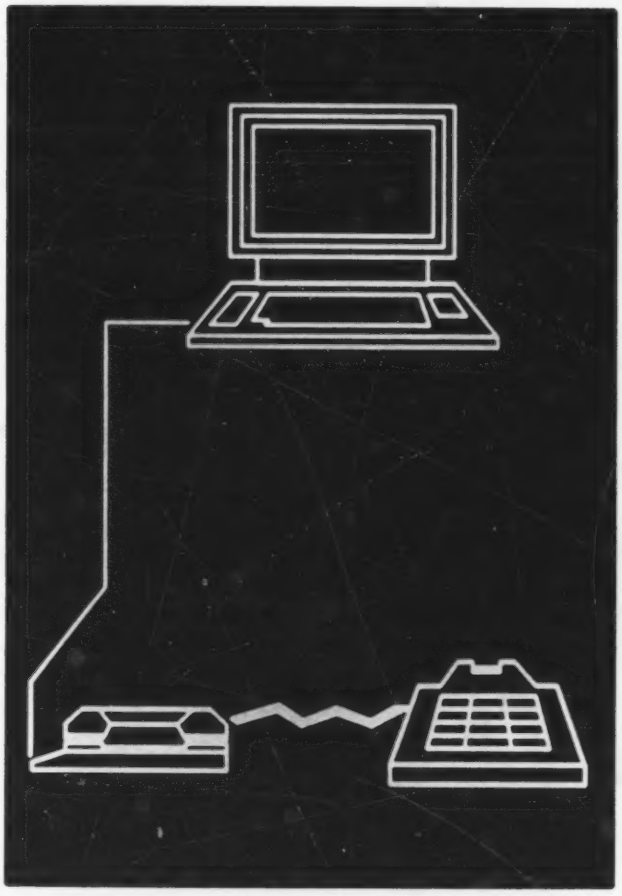
To connect to CompuServe, the subscriber needs a telephone, a computer or terminal, and a modem to link the two. CompuServe donated connect time for a six-month period and loaned us several computer terminals and modems.

Eight college-educated deaf people, ranging in age from the early 30's to late 60's, participated in the investigation. All participants were severely or profoundly hearing impaired, with four born deaf, two deafened in childhood, and two deafened as adults. Three were computer professionals, three held other professional jobs, and two were retired. Five of the participants had home computers and four of these already had a modem. We provided terminals and modems to those who did not have their own equipment.

The participants in the six-month trial received no special training in the use of CompuServe, relying solely on written materials from the company and the on-screen help menus of the service. Not all of CompuServe's features were available to the participants, however; users could not send or receive electronic mail, for example, nor receive CompuServe's monthly magazine. Other features of CompuServe, including access to information on such topics as education, travel, the AP news, updates on news from USA Today and other publications, NOAA weather reports, electronic shopping, financial news, and health features were available for our study.

After they had used CompuServe for two months, we met with the eight participants for a two-hour focus group discussion of their experiences with the service. Their usage of CompuServe was varied. One person connected to the service almost daily, for example, while another did not even read the literature provided. In general, those participants in the study who were computer hobbyists enjoyed their connect time and used the service frequently, while those who were less familiar with computers or who used them only in their work connected less frequently. Four participants indicated that they would continue to use the service even if charged the normal connect rates, which range in price from $12-$15 per hour during daytime hours and $6-$12 per hour in the evening.

We found no discernable "deaf" or "hearing impaired" patterns of usage that distinguished these participants from the general profile of CompuServe users. Without the opportunity to use the electronic mail feature, however, we feel that our exploration of all potential communication uses of the technology was limited.



*To connect to CompuServe, the subscriber needs a telephone, a computer or terminal, and a modem to link the two.*

# Center for Auditory and Speech Sciences

*Sally G. Revoile, Director*

*Faculty/Staff:*
*Lynne Bernstein*
*Doris Bitler*
*H. Timothy Bunnell*
*Yulin Chen*
*Janet A. Droge*
*Donna M. Edward*
*Peter J. Fitzgibbons*
*Lisa Holden-Pitt*
*Nicola D. Pate-Allen*
*James E. Whitney II*
*Amy Villalba*

Researchers in the Center for Auditory and Speech Sciences (CASS), perform experiments with the goal of improving the perception of speech by deaf and hearing impaired people, either by auditory, visual, or tactile means. Through their auditory experiments, they attempt to discover and define the exact types of distortions imposed by hearing impairment on the perceptions of specific speech sounds. New programs of research underway in CASS include studies to develop tactile devices to aid lipreading and investigations of temporal deficits in hearing among the elderly.

Recent work at CASS has used natural speech altered by computer to test the abilities of both hearing impaired listeners and listeners with normal hearing to discriminate among particular speech "cues." Results show that hearing impaired subjects are somewhat less able than subjects with normal hearing to profit from the built-in redundancy of speech cues. Also, individuals with similar audiograms appear to vary a great deal in their ability to comprehend speech.

*Sally G. Revoile*

By examining precisely what individual hearing impaired listeners miss when they are unable to distinguish among different speech sounds, the researchers hope to find ways to program hearing aids to accomplish something more than the simple increase in volume offered by most currently available aids. They hope their research will lead to the development of hearing aids able to supply more exact auditory information an individual listener needs to improve his or her speech perception.

# Perception of Complex Auditory Stimuli by the Deaf

***GRI Investigators:***
*Sally G. Revoile*
*H. Timothy Bunnell*
*Lisa Holden-Pitt*
*Donna Edward*
*Janet Droge*

***External Collaborator:***
*James M. Pickett*
*Professor Emeritus*
*Gallaudet University*

***Extramural Funding:***
*National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke*
*$1,004,297*

***Project Duration:***
*Sept., 1986 to Aug., 1991*

In this 24th year of an ongoing project that began under the direction of James M. Pickett (now retired) in 1964, we concentrated on studying the ability of hearing impaired listeners to use essential acoustic information (or cues) to identify consonants embedded between vowels (that is, "intervocalic" consonants). We determined the listeners' use of the consonant cues by examining their performance identifying syllables with all acoustic cues present in contrast to their performance identifying syllables in which the cues have been systematically degraded. We tested the intervocalic consonants for identification both (a) in the sentences in which they were spoken, and (b) as vowel-consonant-vowel syllables extracted from the sentences.

Our first task was to prepare the necessary stimuli. The consonants P, T, K, F, S, B, D, G, V, Z, TH (as in "the"), and "th" (as in "think") each served as the target consonant (C) in the sentence "There's a du(C) other than that." We recorded numerous repetitions of the sentence by a male talker for each of the target consonants. From this recorded pool, we selected as the test stimuli six different sentences for each consonant, basing our selection on various acoustic characteristics of the recorded sentences.

During fall 1987 we focused on studies of listeners' ability to use the cues for intervocalic consonants that are not voiced. Twenty-two hearing impaired college students and six college students with normal hearing served as listeners. Their identification was tested for each of /P, T, K, F, S, (th)/ in the intervocalic stimuli and also in syllables in which the consonants were spoken before or after a brief pause midway in sentences. (The pre-and post-pausal context yielded stimuli more similar to those used in clinical audiometry and in much of speech science.) The response set for the identification tests displayed the six target consonants from which the listener selected the consonant heard for each stimulus presented. In one of the test conditions of consonant identification with cue-degraded stimuli, the segments representing the consonant sounds, per se, were deleted.

In the intervocalic context, consonant perception by the group of hearing impaired

*Janet Droge observes the effects of speech modification on a hearing impaired listener at the GRI's Center for Auditory and Speech Sciences.*

listeners was significantly better for the consonants presented in extracted syllables than in the complete sentence. Contrary to previous results for listeners with normal hearing, this finding suggests that the sentential cues did not enhance consonant perception for the hearing impaired listeners. Compared to performance for the intervocalic consonants in extracted syllables or in sentences, consonant perception was significantly more accurate for the syllables spoken before or after a pause. Performance by the listeners with normal hearing did not differ among the intervocalic, pre-pausal, and post-pausal contexts. Deletion of the consonant-sound segment reduced consonant identification to chance level performance for both the hearing impaired listeners and those with normal hearing.

During spring 1988 we shifted our attention to the effects on listeners of cues to intervocalic consonants that are voiced. Sixteen hearing impaired college students and six college students with normal hearing participated as listeners. They identified /B, D, G, V, Z, (TH)/, each presented as the target consonant in the intervocalic contexts, that is, within the complete sentence or as vowel-consonant-vowel syllables extracted from the sentences. We prepared nine conditions of acoustic-cue degraded stimuli to examine the relative importance of the target consonant segment versus the offset and onset of the adjacent vowels. (The vowel onset/offset segments are each about 40 milliseconds in duration; they often contain spectral cues important to the identification of voiced consonants.) In these conditions, the consonant-sound segments and /or preceding vowel offsets and/or following vowel onsets were deleted. For example, in one condition the deleted segments were the offset from the vowel preceding the consonant, the consonant-sound, and the onset from the vowel following the consonant.

Data analyses for this experiment are currently underway. Preliminary effects indicate that identification of the intervocalic voiced consonants is primarily dependent on the presence of the consonant sound. In comparison, the cues in the onset and offset of the respective vowels preceding and following the target consonant were considerably less useful for identification of the consonant. This outcome is in contrast to our previous results with citation-style consonant-vowel-consonant syllables in which fairly good consonant identification was achieved through use of the vowel onset or offset in the absence of the consonant-sound segment.

# Hearing Impaired Adults and Their Use of Acoustic Cues for Speech Perception

*GRI Investigators:*
*Sally G. Revoile*
*Lisa Holden-Pitt*
*Donna Edward*

*Project Duration:*
*Oct., 1986 to Sept., 1987*

Some evidence suggests that speech perception deteriorates with age, regardless of a decline in hearing. We wondered whether such deterioration might be manifested in listeners' use of certain spectral cues for consonant perception. In this study we examined whether age affected the use of acoustic cues in the vowel onsets and/or noise bursts[1] for the identification of certain consonants in the initial position of spoken syllables. We compared consonant identification between younger and older adults with normal hearing and between two subgroupings by age of the older adults. We examined speech acoustic-cue use by way of consonant identification for natural versus cue-degraded syllables.[2]

We divided 39 subjects with normal hearing and 9 with mild hearing losses into four groups: (1) twelve young adults (aged 17 to 30) with normal hearing; (2) sixteen senior adults (aged 55 to 65) with normal hearing; (3) eleven seniors (aged 66 to 75) with normal hearing; and (4) nine seniors (aged 65 to 70) with mild hearing losses. Normal hearing was defined as less than a 20 decibel (dB) mean hearing level for pure tones of 500, 1000, and 2000 hertz (Hz).

The base set of stimuli were five spoken utterances, the syllables "BACK," "GACK," "DACK," "WACK," and "YACK." These composed the natural test condition. The bursts deleted condition used the same syllables except that we had removed the consonant noise bursts at the onset of the test syllables that have initial stop consonants, that is, BACK, GACK, and DACK. We presented these two stimulus conditions in quiet at 75 dB sound pressure level (SPL), and at 95 dB SPL for most of the listeners. In addition, for the senior adults, we presented the stimuli with a white noise masker (15 dB S/N) digitally added to the waveform signals. We altered the syllables by manipulating visually-identified sections of the speech waveform with a computer.

We randomized the utterances of each test condition and presented them singly for identification by the listeners. The listeners' response alternatives consisted of the five test syllables BACK, DACK, GACK, WACK, YACK, plus the syllable ACK to be selected when no initial consonant was perceived.

We scored the percentage of correctly identified consonants per syllable type for each test administration. Mean scores among the listener groups appear in Table 1. Pooling the scores across consonants yielded similar levels of performance.

To examine performance differences among listener groups, syllable conditions, and signal intensity levels, we conducted numerous analyses of variance. We found no observable difference in consonant identification between the 75 versus 95 dB SPL signals for the natural syllables in quiet. However, the addition of the masker and/or the deletion of stop noise bursts had considerably greater impact on syllable perception at 95 than at 75 dB SPL. The three groups of listeners with normal hearing did not differ in their perception of the consonants in the natural or modified syllables; use of the transition and stop burst cues was also similar. The hearing impaired group, however, typically showed poorer syllable identification scores than those of the groups with normal hearing, as illustrated in Table 1.

We generally found greater differences between the normal-hearing and the hearing impaired groups for BACK than for GACK/DACK or WACK/YACK. Over all listener groups, the "w" and "y" sounds were generally identified more accurately than the "b" "g" or "d" sounds. For the natural syllables of BACK versus GACK/DACK presented in quiet, performances were rather similar. However, the burst deletion had a much greater effect on GACK/DACK syllables than on BACK. For GACK/DACK, perception of the initial consonant was reduced to near-chance levels when the noise bursts of "g" and "d" were deleted from the syllables, both in quiet and in noise. This result shows the listeners' heavy reliance on the approximately 20 millisecond consonant noise bursts for correct identification of GACK/DACK.

As the WACK/YACK syllables were identical in the natural versus the bursts-deleted conditions, it was no surprise that the obtained mean score differed by no more than 3% between these two conditions. Thus, only the natural syllable results appear in Table 1. While the 75 dB level yielded mean WACK/YACK identification scores of better than or equal to 90% in quiet and in noise for each listener group, at the higher syllable presentation level (95 dB) the masking noise reduced scores by at least 11% with a dramatic 57% drop for the hearing impaired group.

The observed similarity in performance patterns for the younger versus older normal hearing groups indicates that advancing age, when isolated from decline in hearing

thresholds, does not necessarily imply poorer perception of isolated syllables as tested in this study. The frequent departure of the hearing impaired group's performance from that of the groups with normal hearing may be accounted for by the relatively lower sensation levels of the syllables received by the hearing impaired as compared to those heard by the normal-hearing subjects. Recall that we used the same 75 and 95 dB intensity levels on all subjects. Consequently, due to their mild hearing losses, the hearing impaired group's perceived loudness of the test stimuli was not actually as great as the loudness perceived by the groups with normal hearing.

We have completed the experimental work on this project. We will be presenting a paper on this study at the 1988 American Speech and Hearing Association Annual Convention.[3] Also, we are preparing a manuscript on this work for eventual publication.

Table 1. Listener-group mean % correct identification scores for syllables at 75 and 95 db SPL in quiet (Q) and with noise masking (N) for test condition as indicated.

| Listener Group | | NH[a] 17-30 years (n=12) | NH[a] 55-65 years (n=16) | | NH[a] >65 years (n=11) | | MHL[b] >65 years (n=9) | |
|---|---|---|---|---|---|---|---|---|
| Intensity Level, dB SPL | | 75 | 75 | 95 | 75 | 95 | 75 | 95 |
| a. BACK | | | | | | | | |
| *Natural* | Q | 100 | 100 | 99 | 99 | 100 | 83 | 82 |
| | N | | 93 | 51 | 90 | 68 | 50 | 27 |
| *Burst-Deleted* | Q | 98 | 88 | 53 | 97 | 76 | 76 | 74 |
| | N | | 95 | 80 | 97 | 86 | 68 | 70 |
| b. GACK/DACK | | | | | | | | |
| *Natural* | Q | 99 | 95 | 88 | 96 | 91 | 82 | 90 |
| | N | | 72 | 68 | 79 | 66 | 80 | 79 |
| *Burst-Deleted* | Q | 19 | 10 | 7 | 18 | 13 | 23 | 14 |
| | N | | 21 | 36 | 31 | 35 | 32 | 35 |
| c. WACK/YACK | | | | | | | | |
| *Natural* | Q | 100 | 100 | 99 | 100 | 99 | 99 | 97 |
| | N | | 99 | 88 | 98 | 88 | 90 | 40 |

[a] NH = Normal Hearing

[b] MHL = Mild Hearing Loss

[1] noise burst: the burst of air that follows a complete closure of the articulators, as in the case of stop consonants such as "b" "g" and "d."

[2] cue-degraded syllables: syllables that have been artificially altered so that certain acoustic elements present in the natural speech are now removed or neutralized.

[3] Holden-Pitt, L., Revoile, S., Edward, D., and Hazan, V. Burst/transition cue use by young versus old normal-hearing adults. Paper to be presented at the Annual Convention of the American Speech-Language-Hearing Association, Boston, November 1988.

# Speech Enhancement Based on Articulatory Properties of Clear Speech

***GRI Investigators:***
*H. Timothy Bunnell*
*Doris Bitler*

***External Collaborators:***
*James G. Martin*
*Dept. of Psychology,*
*Univ. of Maryland*
*James M. Pickett*
*Professor Emeritus*
*Gallaudet University*

***Extramural Funding:***
*National Institutes of Health,*
*National Institute of*
*Neurological and*
*Communicative Disorders*
*and Stroke*
*$270,776*

***Project Duration:***
*Aug., 1986 to July, 1989*

This continuing project was motivated, in part, by studies of what talkers do when asked to "speak more clearly." We are studying a computer-based speech-processing algorithm that modifies ordinary or conversational speech in a way intended to mimic the way talkers adjust their speech to improve its clarity. The algorithm works by altering only the sound of the speech. Our hope is that the algorithm could ultimately be incorporated into the speech processing of digital hearing aids.

The methods we use are 1) to record many repititions of a small set of nonsense utterances from different talkers, 2) to determine through experiments how intelligible each utterance is, 3) to determine through acoustic analyses what makes some utterances more intelligible than others, and 4) to try to include these differences in our speech processing algorithm.

The recorded speech we are examining (or the "speech corpus") now includes speech by a total of five talkers. The basic corpus consists of sets of nine selected nonsense utterances (or "tokens") of each of nine stimulus types from each talker. These stimuli were chosen so that each utterance contains one and only one of the consonants /b,d,g/. In our experiment, after hearing an utterance, listeners must identify which of the three consonants is being presented.

One of the talkers, a professional announcer, also produced stimulus sets including 17 additional consonants (/p,t, k, s, z, v, f, sh, zh, th, dh, h, ch, m, n, w, j/), in clear, clear-but-rapid, and conversational speaking styles. When using these extended sets in experiments, listeners must choose from a much larger set of possible consonants. This makes the listening task much more difficult.

*"Our hope is that the algorithum could ultimately be incorporated into the speech processing of digital hearing aids."*

We have conducted a variety of acoustic analyses on a total of 729 of the speech tokens. Some analyses have been directed toward reducing the amount of information needed to describe the acoustic structure of each utterance. Others have been directed toward obtaining measures that may be predictive of utterance intelligibility. We are presently using parameters obtained from these analyses in regression and correlational analyses of the results of our identification studies. These analyses should help us to understand what makes some tokens easier to recognize than others.

The corpus of speech we are using is much more variable than the carefully produced and selected "laboratory speech" most often used in studies of speech perception. Perhaps as a result of this we are finding reduced importance for some often-cited concomitants of utterance intelligibility like stop consonant burst amplitude.

We are also conducting preliminary enhancement studies with groups of 36 speech stimuli at a time. To alter the natural speech sounds, we have used Linear Predictive Coding (LPC) analysis and resynthesis procedures. We have used two versions of LPC synthesis: a "pitch-driven" synthesizer and a "residual-driven" synthesizer. The latter produces higher quality speech but has proven more difficult to use. A number of preliminary experiments helped us determine the optimal testing procedures and speech stimulus preparation techniques.

We have completed or initiated a number of experiments to test variations in the way exaggerations are applied to synthesizer

parameters. In particular, we have examined the possibility of altering some synthesis parameters more than others, examined effects of applying greater or lesser amounts of change (called "gain") to the speech, and examined the effects of varying another algorithm parameter called the averaging "window." The results, in general, can be summarized as follows:

- Altering some parameters more than others generally does not produce a significant improvement in the algorithm.

- Effects of the algorithm on speech intelligibility are a "U-shaped" function of the amount of change we introduce into the speech. Intermediate amounts of change produce the greatest improvement in intelligibility.

- Variations in the length of the averaging window appear to interact with speaking rate and are the subject of further study.

As noted above, we have used both pitch-driven and residual-driven syntheses in these experiments. Earlier residual-driven experiments yielded generally negative gain effects for all target classes, but recent modifications in our residual-driven syntheses appear to yield results more like those for pitch-driven encoding. This outcome could be important, not only because residual synthesis is of higher quality, but also because it shows that enhancement can improve the intelligibility of both poor quality LPC synthesis and the raw waveform itself under adverse listening conditions.

# Genetic Services Center

*Kathleen Shaver Arnos, Director*

*Faculty/Staff:*
*Margaret M. Cunningham*
*Katy Downs*
*Jamie N. Israel*
*Elizabeth Korres*
*Vanessa O. Slade*

The Genetic Services Center (GSC) was established by the Gallaudet Research Institute in 1984 to seek a fuller scientific understanding of the more than 200 known genetic forms of hearing impairment, as well as of certain other forms of deafness acquired through disease or physical trauma. A second GSC function which is of equal importance is to use these basic research findings in promoting greater understanding of the causes and likely effects of the various forms of hearing loss among individuals in the deaf community and their families, as well as among counselors, geneticists, and the medical community.

*Kathleen Shaver Arnos*

The GSC is currently serving approximately 100 families per year through individualized diagnostic services. The genetic evaluations are based on family medical histories, prenatal records, and audiological reports. Physical examinations and diagnostic tests are also performed by a clinical physician trained to recognize the physical clues related to hereditary deafness. The resulting in-depth genetic profile focuses on the specific cause of the deafness in question and the possible impact that form of deafness may have on the individual diagnosed, the family, and future generations.

The GSC staff members are also conducting research on the occurrence of diabetes mellitus in persons born deaf as a result of maternal rubella. They hope to gain a more complete understanding of an apparent link between the Congenital Rubella Syndrome and diabetes. This research is influencing medical evaluations of the genetic and environmental causes of diabetes in general, a disease that affects the lives of both deaf and hearing individuals.

In addition to the above services, the GSC provides educational outreach activities across the country in the form of workshops and seminars to over 1,000 persons per year, including deaf consumers, parents, educators, audiologists, physicians, and other geneticists.

# Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population


***GRI Investigators:***
*Kathleen S. Amos*
*Margaret M. Cunningham*
*Katy Downs*
*Jamie Israel*

***External Collaborators:***
*Walter E. Nance, Joann N. Bodurtha, and Susan Black*
*Medical College of Virginia*
*Kenneth N. Rosenbaum, Harvey Stern, and Howard Saal*
*Children's Hospital National Medical Center*
*Kathleen E. Toomey*
*St. Christopher's Hospital for Children*



***Extramural Funding:***
*Department of Health and Human Services*
*$1,111,179*

***Project Duration:***
*Oct., 1984 to Sept., 1990*


As scientific advances such as the rubella vaccine continue to diminish the various environmental causes of deafness, the proportion of deafness caused by hereditary factors is likely to increase. Recent demographic and genetic studies indicate that genetic factors now contribute to at least 50% of the hearing losses present at birth or occurring in early childhood in the United States. Deaf and hearing impaired people and their family members are becoming increasingly interested in the topic of genetic deafness. Until recently, however, the deaf population was underserved in receiving genetic services, largely because of language and cultural barriers. This six-year project has provided funding for the creation of the Genetic Services Center, designed to provide clinical evaluation, genetic counseling, and educational services to the deaf population both at Gallaudet University and across the country. The majority of our clients are from the Gallaudet community but, through involvement with the D.C. Commission of Public Health and organizations such as Deafpride, Inc., we also provide genetic services to Washington, D.C. residents and their families.

The Genetic Services Center at Gallaudet also serves as a model to other centers in the United States for the provision of genetic services to the deaf community. In addition to providing clinical genetic evaluation and counseling to individuals about the specific cause of their deafness, we present lectures and workshops both on campus and in the community to increase awareness about genetics in the deaf community and among medical and deafness professionals. A Gallaudet University Presidential Award during the past year supplemented and expanded these outreach efforts.

Our clinical services are provided during twice-monthly clinics held at the Gallaudet University Student Health Service. Each client provides extensive family and medical histories prior to the clinic appointment. At the clinic, the client undergoes a detailed physical examination, performed by one of the subcontracting genetics physicians from local medical centers and universities.

After a diagnostic opinion is reached, the client and all available family members participate in a genetic counseling session where we share information with them about the cause of their deafness and its implications in the family, and provide an opportunity for them to discuss their feelings and ask questions. Our role is to share information and, when needed, provide emotional support. To provide such services effectively, counselors must understand not only genetics but also the linguistic and cultural differences that cause many deaf clients to regard genetic information from a perspective unlike that of many hearing couples with deaf children.

During the academic year 1987-1988, we provided clinical genetic services to 120 deaf clients and their families. Most of these individuals were Gallaudet University students, but an increasing number were from off-campus. Approximately 300 deaf people were referred to the Genetic Services Center over the past year for genetic counseling, the majority self-referred.

During the next several years of the project period, we will continue to provide genetic screening, evaluation, diagnosis, counseling and follow-up services to both the Gallaudet and Washington, D.C. deaf communities.

*A typical family genetics counseling session.*

# Program Assessment and Outreach Implementation for the Gallaudet Genetic Services Center

*GRI Investigators:*
*Kathleen S. Arnos*
*Margaret M. Cunningham*
*Katy Downs*
*Jamie Israel*
*Michael A. Karchmer*

*Extramural Funding:*
*Gallaudet Presidential Award*
*$18,000*

*Project Duration:*
*Sept., 1987 to Aug., 1988*

This project was initiated to collect data and provide services to complement the major activities of the Genetic Services Center. The main goals were (1) to design and distribute questionnaires to assess the effectiveness of the clinical services we have provided since the Center was established and (2) to expand our educational outreach activities by providing additional workshops and lectures on genetics and deafness.

The first goal involved collecting information from our client population who had already received genetic counseling services as well as from new clients who had recently requested services. To do this we designed several questionnaires to cover such areas as the reason for referral for genetic counseling, the clients' expectations of the genetic counseling process, their satisfaction with the services provided, and the degree to which they retained the information shared during a counseling session. We will use this information to prepare publications on the expectations and needs of deaf clients for professional genetics forums and workshops. This data will also help us determine how well our clients understand and retain the information provided during counseling so that we can make appropriate program adjustments.

Final drafts of the questionnaires are currently being evaluated by a panel of deaf and hearing professionals and will be distributed before the end of the funding period. We will collect and analyze the data from previous and current clients during the coming year as part of the continuing genetic counseling project, and will distribute questionnaires to all new Genetic Services Center clients as well.

The second goal of the project is to improve the knowledge and understanding of genetics and deafness among consumers, parents, educators, health care workers, and others who work with deaf clients. To accomplish this goal, we are providing day-long workshops on genetics and deafness at sites across the country. Many of these workshops have been coordinated through the five Gallaudet Regional Centers, with considerable assistance from the National Academy. The all-day workshops cover such topics as an introduction to cell biology and modes of inheritance, genetic syndromes involving hearing impairment, the genetic evaluation and counseling process, an overview of the Gallaudet genetics program, and information about new technology in genetics. More than 1,300 people attended these workshops and lectures during the past year.

*Charts are often used to communicate the complexity of genetics.*

In addition to the workshops held at the Gallaudet Regional Centers, lectures and workshops were held at such locations as the Children's Medical Center in Tulsa, Oklahoma, the University of California at Berkeley, and California State University in Fresno. We also provided lectures and genetic counseling services at the American Association of the Deaf-Blind convention in Baton Rouge, Louisiana, the Speech and Hearing Association of Virginia convention, and the Royal National Institute for the Deaf in London, England.

The outreach efforts initiated as part of this project will be continued with funds provided by the larger genetic counseling project. Requests from professional and consumer groups from across the country have multiplied since this outreach effort began. In response, we are planning a series of workshops in Minnesota, Louisiana, New York, and other cities to occur during the next several months.

# Genetic Epidemiology of Diabetes in Rubella Deafness

*GRI Investigator:*
*Kathleen S. Amos*

*External Collaborators:*
*Walter E. Nance and Joann N. Bodurtha*
*Medical College of Virginia*

*Extramural Funding:*
*National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases to Medical College of Virginia*
*$135,850*

*Project Duration:*
*Sept., 1983 to Aug., 1988*

This five-year study, completed during the 1987-88 academic year, was designed to examine the incidence of diabetes and prediabetes in persons deafened by the Congenital Rubella Syndrome. Previous research has shown that almost 20% of persons with the Rubella Syndrome will develop diabetes or a prediabetic condition at some time in their lives. In the present study, we searched for clues to show that the rubella virus may trigger a genetic predisposition to diabetes in those persons who eventually develop the condition. Such information not only makes possible the development of preventive treatment for susceptible individuals before the onset of the disease, but also enhances the medical professions' general knowledge about the true cause of one form of diabetes, now suspected to be an abnormal response of the immune system to viral infection. For these reasons, we also examined possible maternal and fetal genetic factors, including genetic markers involved with the immune system, that may make the child more susceptible to the effects of the rubella virus.

We focused our attention on a target population of students from schools for the deaf in the vicinity of Washington, D.C., including Gallaudet, born during the rubella epidemic of 1964-65 or known to have been deafened as a result of the Congenital Rubella Syndrome. Approximately 600 students were tested during the project's testing period, which ended last year. Each of the students received a complete physical examination by one of the project physicians to confirm the diagnosis of Congenital Rubella Syndrome. Laboratory testing involved a two-hour glucose tolerance test for diabetes as well as extensive blood typing for genetic markers, including rubella antibodies and other abnormal antibodies produced against such normal body tissues as the thyroid gland or the pancreas. The parents of each of the students provided information about the family history of deafness or diabetes and the occurrence of rubella during the mother's pregnancy.

During the past year we collected further data on many of the 600 subjects to determine if any had become diabetic since their initial tests. We also collected information on those participants who had since become pregnant, to help determine if females with the Rubella Syndrome are more susceptible to becoming diabetic during pregnancy or more likely to have children with birth defects.

Preliminary results of the study show that 20% of those students tested over the entire project period have abnormal glucose tolerance test results, including several who are now diabetic. This is significantly higher than the percentage shown by control groups, and confirms the findings of previous research. Further, almost 20% of the rubella students have thyroid abnormalities, a finding that suggests involvement of the immune system in the diabetic process. We are currently performing additional detailed analysis of this data to define more specifically the relationship between these two major findings.

# Mental Health Research Program

*Acting Director:*
*Michael A. Krarchmer*

*Faculty/Staff:*
*Barbara A. Brauer*
*Denise Dahlin Radecke*
*Herb Sutcliffe*
*Barbara A. Willigan*
*Anthony B. Wolff*

The Mental Health Research Program (MHRP) is one of three new units established by the Gallaudet Research Institute during the past year. The overall goals of the MHRP are to explore causes and effects of mental health problems among hearing impaired individuals and to develop improved methods of assessment and treatment of these mental health problems. Researchers in the MHRP are also exploring ways to improve the training of mental health professionals who work with hearing impaired clients.

Specific projects being pursued by this unit include a study of differences in cerebral organization among hearing children, children with hereditary deafness, and children who are deaf from disease or physical trauma. Awareness of differences in these children's cognitive processing styles may enable mental health professionals and educators who work with deaf children to take better advantage of these children's cognative strengths and to help improve cognitive processing in need of strengthening.

The MHRP is also now primarily responsible for a task that has been underway for a number of years in other GRI units: The translation into American Sign Language of such standard psychological instruments as the Beck Depression Inventory and the Minnesota Multiphasic Personality Inventory. Tests developed for use with hearing, English-dominant children and adults have often led to misdiagnosis when applied to non-hearing, ASL-dominant subjects. The MHRP's translations will ultimately enable mental health professionals to choose the assessment instruments that are most appropriate for their hearing impaired clients.

Researchers in the MHRP have also begun working on such projects as the development of a personality profile for deaf college students, a study of depression among deaf adults, and the formulation of strategies for coping with hearing loss among people who have lost their hearing in adulthood.

# Neurobehavioral Project

*GRI Investigator:*
*Anthony B. Wolff*

*External Collaborators:*
*Robert W. Thatcher*
*Univ. of Maryland Eastern Shore and Univ. of Maryland School of Medicine*
*Betsy L. Kammerer*
*Boston Childrens Hospital and Harvard Medical School*
*Judith K. Gardner*
*Boston Childrens Hospital and Harvard Medical School*

*Project Duration:*
*Jan., 1984 to present*

In the Neurobehavioral Project we are exploring aspects of cerebral organization and functioning in deaf children. Because many causes of deafness, such as rubella, bacterial meningitis, RH factor incompatibility, or other physical trauma, can also potentially damage the central nervous system and place the individual at-risk for neurological dysfunction, we are attempting to separate findings into two categories: those brain-behavioral phenomena in deaf children attributable to neurologically-at-risk (NAR) etiologies and those brain-behavioral phenomena attributable to deafness itself (that is, attributable to the lack of hearing in the absence of other complicating physiological factors).

Our goals in this project are (1) to explore electrophysiological indicators of differences in cerebral organization between deaf and hearing children and between NAR deaf children and those whose deafness is hereditary, as evidenced in brain wave patterns produced by such tests as the electroencephalogram (EEG), and (2) to explore neuropsychological differences among these same groups.

Ninety-three deaf children from the Washington, D.C.-Baltimore area, ages 6 through 16, served as subjects in the study. Forty-two had NAR deafness, 36 had genetically caused deafness, and 14 had unknown etiologies. Ninety-three age- and IQ-matched hearing children selected from the data base of the University of Maryland Applied Neurosciences Laboratory composed the control group.

We gave the children a battery of neuropsychological tests designed to assess a wide range of functions, including cognitive flexibility, organization, visual memory, verbal memory, sequential memory, impulsivity, activity level, fine and gross motor development, lateral dominance, and emotional adjustment, among others. This test battery was selected to be unbiased by linguistic and cultural limitations that can invalidate standard neuropsychological tests of deaf children.

In addition to the data gathered through this battery of tests, we obtained EEG data on each child and collected information on such variables as family background, educational background, and medical history. The raw EEG data, which presents pictures of the electrical patterns emitted by the brain, were used to establish a set of indices reflecting cerebral functioning for each child.

During the 1987-88 academic year we further refined and extended the picture of brain-behavior relationships in deaf children that emerged from the data. Previous analyses of the EEG data revealed a pattern of cerebral reorganization in deaf children, clearly distinguished from that of hearing children, that also varied somewhat, depending on cause of deafness. In general, genetically deaf subjects manifested certain electrophysiological "advantages" over NAR subjects, suggesting that, indeed, NAR etiologies have neurologically compromising consequences in some deaf individuals. Analyses conducted this year suggest that these advantages may be partially, but not completely, attributable to the early exposure to deaf culture and sign communication among the deaf children of deaf parents sub-group.

Analysis of neuropsychological variables has also yielded an interesting pattern of results: genetically deafened children exhibit some advantages in cerebral organization, as demonstrated in certain visual, visual-motor, and purely motor tasks when compared with the hearing group and with the NAR deaf children; genetically deaf subjects also exceeded hearing norms on certain sequencing and memory tasks. Other tasks, however, were performed less well by both

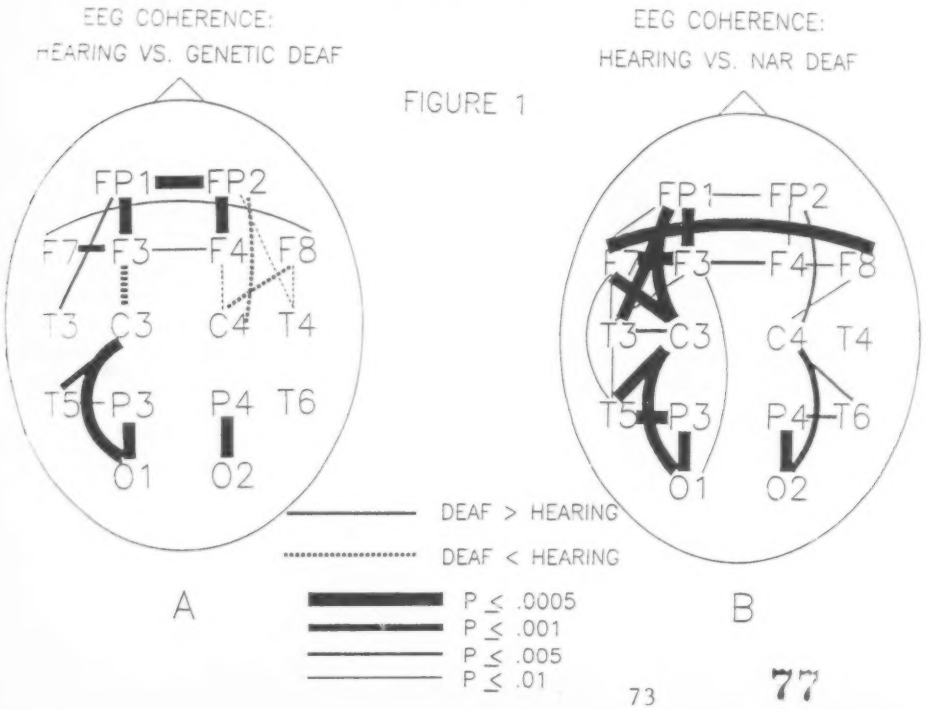
groups of deaf children than by hearing children, including a number of visuo-spatial and verbo-sequential tests. Deaf children showed evidence of more emotional/ behavioral difficulties than hearing children, and this was more strongly the case for NAR than genetic subjects. These findings are consistent with the notion that deafness itself results in cerebral reorganization among deaf individuals, a fact that is apparently related to differences in cognitive processing or style.

We are also exploring the relationships among the electrophysiological and neuropsychological measures, with the goal of relating various cognitive and behavioral results to components found in the electrophysiological picture. We are finding a variety of relationships between EEG indices and neuropsychological measures, including those related to visuo-spatial functioning, IQ, memory, and lateral dominance.

One of the instruments we used in this study was the Stroop Color-Word Interference Test, which measures cognitive flexibility, among other things. Analysis of the instrument itself revealed that deaf subjects' performance speed was affected by the use of signed output, thus potentially invalidating the application of "hearing" norms to these deaf test-takers. A deaf norming study grew out of this concern, resulting in a preliminary set of deaf adult norms. We will present this work at the next meeting of the National Academy of Neuropsychologists to be held in Orlando, Florida in November, 1988.

On the whole, a clearer picture of neuro-cognitive-behavioral functioning in deaf children is emerging from this work. Perhaps the key point is that deafness is accompanied by a certain degree of cerebral and cognitive reorganization, resulting in a processing style that is neither "better" nor "worse" but is in some respects different from the hearing norm. We hope that this greater understanding of neuropsychological functioning, as well as the development of specific assessment tools used in this project, will facilitate not only evaluation but educational and mental health interventions with deaf individuals.

FIGURE 1




*This figure is representative of topographic maps based on quantitative analyses of EEG data. The technique of topographic brain mapping, which involves no risk for the subject, can reveal various aspects of cerebral functioning.*

# Translation of Psychological Instruments into American Sign Language: An Introduction

*GRI Investigator:*
*Barbara A. Brauer*

*External Collaborators:*
*W. Grant Dahlstrom*
*MMPI consultant to the*
*Univ. of Minnesota Press*
*Aaron Beck*
*Univ. of Pennsylvania*
*Jonathan Fay*
*St. Elizabeths Hospital*

*Project Duration:*
*1983 to present*

One important issue in mental health diagnosis and treatment has centered on what type of test best measures the status of a person's mental health or psychological well-being. In relation to deaf people, this problem is made more difficult by the lack of psychological tests presented in American Sign Language (ASL), the language used by the majority of the American prelingually deaf adult population. Even when a sign language interpreter's services are used in assessment situations, interpreter-related distortions may give rise to misconceptions about the patient's mental health status. These distortions are often associated with the interpreter's inadequate linguistic or translation skills, lack of psychiatric knowledge, or self-imposed role and attitude toward either the client or clinician. Translation of standard psychological assessment instruments into ASL, therefore, should alleviate some of the misdiagnoses that occur when assessing early-deafened individuals through tests written in English.

We have translated twelve self-report psychological instruments into ASL since this project began in 1983. Although we are aware of reports in the literature regarding the questionable practice of assessing ethnic, socioeconomic, or linguistic minorities with instruments conceived, standardized, and validated from a non-minority, middle-class, English-speaking perspective, we chose to translate existing psychological assessment instruments rather than develop new instruments for use with deaf people. We feel that the use of established instruments will provide valuable information about deaf individuals and permit some comparison of results with those from studies conducted with the norm (hearing) group. In this way, we may be able to make determinations regarding the extent to which the "psychological world" of deaf persons is similar to or different from that of persons who hear, thus giving this project added importance for basic mental health research among the deaf population.

We have translated the following instruments into ASL:

(1) Beck Depression Inventory
(2) Barrett-Lennard Relationship Inventory
(3) Tennessee Self-Concept Scale
(4) Symptom Check List-90, Depression Scales
(5) Psychiatric Epidemiology Research Interview
(6) Social Adjustment Scale
(7) Life-Events Questionnaire
(8) General Life-Functioning Scales
(9) Carroll Rating Scale
(10) Dysfunctional Attitude Scale
(11) Medical Check List
(12) Minnesota Multiphasic Personality Inventory (MMPI) [with permission from the University of Minnesota Press]

We are now conducting an assessment of the reliability of the translated MMPI test items.

A team approach was used to create the ASL translations. A group of bilinguals translated the test items from the source language (the original written English version) to the target language (ASL). A second, separate group of bilinguals then retranslated the ASL items back into English. A third group, composed of both bilinguals and monolinguals, compared and checked the two English versions for discrepancies. Any significant differences between the back translations and the original English versions resulted in a revision of the first-draft translation.

Steps taken during 1987-88 resulted in our establishing the psychological equivalence of the ASL-version tests to their English counterparts, based on an item-endorsement frequency study of deaf college students' responses to the ASL-MMPI items that we completed in 1986-87. The stage is now set for the preparation of prototype ASL-version tests, incorporating all requirements and modifications from our experimental translations. In general, after we obtain sets of empirical data supporting the reliability and validity of the translated instruments, we will use them in a study of the treatment of depression in deaf persons, with a view to further developing their future clinical applications.

We also continued our work on three sub-studies designed to determine whether certain techniques we had used in the translation process affected the integrity of the translated products. These sub-studies are discussed in the next project summary.

# Substudies Developed during the Psychological Instruments Translation Study

*GRI Investigators:*
*Barbara A. Brauer*
*Barbara A. Willigan*

*Project Duration:*
*1986 to present*

*Anthony B. Wolff and Barbara A. Brauer discuss the videotaped ASL translation of the MMPI.*

During our translation of the twelve self-report psychological instruments from English to American Sign Language, we became aware of three issues that merited additional scrutiny: (1) whether monolingual and bilingual raters would respond differently to the accuracy of the translated text; (2) whether test-takers would respond to the signer or to the test items; (3) and whether the English version or the ASL videotaped version of the assessment instrument would yield the most accurate picture of the test-taker's psychopathology.

• The use of monolingual vs. bilingual raters in a back translation study: During our translation procedures we wanted to examine the issue of biculturalism as it related to translation reliability and accuracy in addition to the issue of language. For this reason we used bilingual as well as monolingual raters to compare the English versions (the original English and the back translation) and check for discrepancies.
This sub-study compared the ratings of back translations for the Beck Depression Inventory to determine what differences, if any, appeared in ratings given by monolinguals vs. bilinguals. Two bilingual deaf professionals and two monolingual hearing professionals with at least minimal ASL skills served as raters in this study. When we compared the ratings of the bilinguals with those of the monolinguals, we found that the bilingual raters consistently judged the back translations as more similar to the original English versions in intent, meaning, and/or content than the monolinguals rated them. Further exmination of the ratings suggests that the bilinguals were more biculturally sensitive to seemingly different nuances between the original English and the back translations. That is, the bilinguals demonstrated the ability to "think deaf." Thus, it appears that the issue of biculturalism, in addition to that of bilingualism, needs to be considered when determining discrepancies in the back translations of other psychological instruments adapted for use with a deaf population.

• The signer effect on MMPI test performance of deaf respondents: Since translating written tests into sign language requires that a person sign the test items in front of a camera that records the signing on film or videotape, we were concerned about the possible introduction of non-objectivity or non-neutrality into the test items by the signer, as compared with the relatively "neutral" effect of a paper-and-pencil format. That is, we felt that there may be an inherent signer effect on the test performance of deaf respondents due to signer personality, facial expressions, signing style,

and so forth.

This sub-study was undertaken to determine whether such a signer effect existed by comparing deaf subjects' responses to the same sample of MMPI items rendered by two different signers. The two signers were similar in several respects. Both were female, deaf since birth, of deaf parentage with deaf siblings. Both had attended residential schools and both were college graduates. However, they were decidedly dissimilar in personality and signing style.

The 38 MMPI "Critical Items" were used as the item pool for this study. Each signer made a videotape of these 38 items, which were then shown to a group of 35 deaf college graduates recruited from the Washington, D.C., metropolitan area deaf community. Sixteen subjects responded to signer #1 first and 19 subjects responded to signer #2 first. After an appropriate time interval, we reversed the order of presentation.

Although the extent to which the findings of this study may be generalized is limited to the population from which the subjects were selected, the results demonstrated the absence of signer effect. That is, it seemed to make no difference to the subjects who signed the items; the subjects responded essentially to the signed text, not to the signer. Thus, despite its limitations, this study underscores the potential practicality of future ASL translations for use with deaf individuals, as long as researchers and clinicians are constantly attentive to translation refinements and to the importance of using native ASL-users to present test items in a psychologically professional manner.

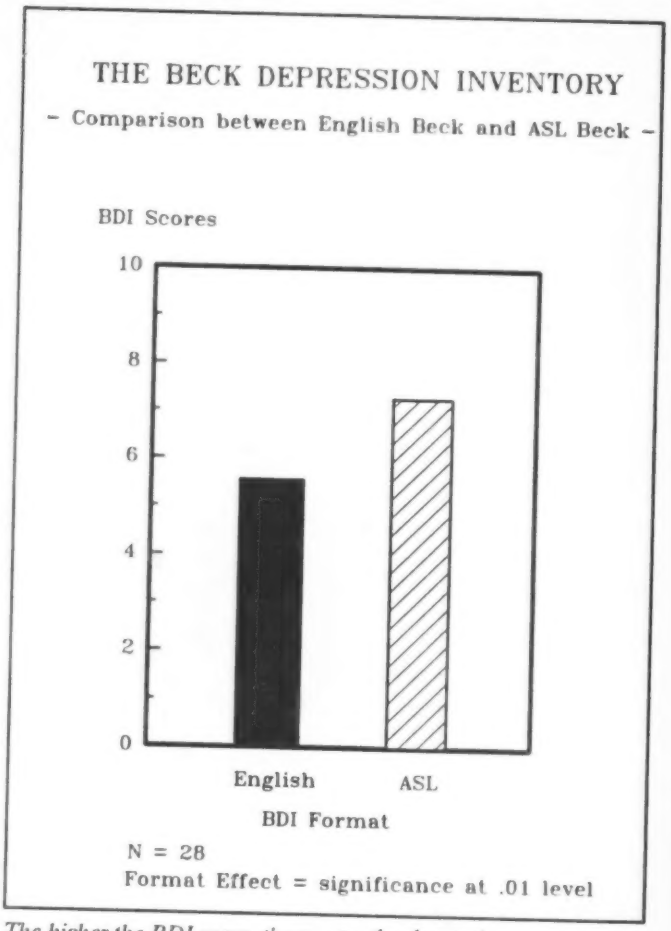
• The expression of psychopathology as a function of language dominance: Research literature on the psychiatric evaluation of ethnic minorities often refers to frequent misdiagnosis of minority patients by non-minority clinicians, presumably as a consequence of such sociocultural barriers as the interplay of bilingualism and biculturalism.

Some reports in the literature reveal that psychotic processes are more likely to be expressed accurately and vividly in a patient's native language than in a less familiar second language. Contrary evidence from other studies, however, suggests that it is the clinician rather than the patient who is more affected by language use.

The following questions emerged in conjunction with the ASL translations of psychological instruments: In which language, English or ASL, do bilingual deaf individuals express greater psychopathology, and which language conveys the true nature and extent of that pathology?

We administered our ASL translations of the Beck Depression Inventory and the Symptom Check List-90 to 28 adult deaf individuals from the Washington D.C. area in a bilingual test-retest reliability study. The subjects responded to both the original written English versions of the two tests as well as the videotaped ASL versions. Analyses of the results from these tests suggest that the ASL version of the Beck elicited greater depressive symptomatology than did the English-version Beck.

Although findings based on such a small, homogeneous sample cannot be generalized to the larger deaf population in the United States, the results do indicate that researchers and clinicians need to consider the client's dominant language when evaluating test results of bilingual clients.




*The higher the BDI score, the greater the depressive symptomatology being expressed by the client.*

# Personality Profile of Deaf College Students Using the ASL-Version of the MMPI

***GRI Investigators:***
*Barbara A. Brauer*
*Anthony B. Wolff*

***External Collaborators:***
*W. Grant Dahlstrom and Jonathan Fay*
*St. Elizabeths Hospital*

***Project Duration:***
*1985 to present*

The Minnesota Multiphasic Personality Inventory (MMPI) is the most widely used personality inventory. Over the years, it has stimulated an increase in mental health research in general. We expect that appropriate implementation of the new ASL-version of the MMPI will greatly enhance and expand mental health research as applied to deaf individuals. Analyses of responses from a bilingual test-retest reliability study of the translated MMPI indicate that the ASL translation accurately measures the personality dimensions assessed by the English version of the inventory (see page 74).

To further refine the translation and to determine whether the ASL version of the inventory could successfully identify various psychological profiles among deaf persons, we administered the videotaped ASL MMPI to 130 deaf college students from the Gallaudet campus.

Preliminary results suggest some general differences between the psychological characteristics of the deaf students tested and the psychological profiles generally noted among hearing students who take the English version of the MMPI. We are continuing to analyze these results to determine whether or not the emerging deaf personality profiles are indeed reliable.

Preliminary analyses of the responses from within this demographic group of deaf college students hint at differences between students who previously attended residential school and those who were mainstreamed, as well as at differences between deaf students with deaf parents and those with hearing parents.

Before we can draw definite conclusions from the data, however, and before the ASL-version of the MMPI can be made available for general research application and clinical use, we need to further refine the ASL translation. Once the language barrier to psychological test accessibility has been successfully overcome, we will be able to address problems resulting from test items frequently misinterpreted by deaf people because of their different cultural or sensory experiences.

# Prevalence of Psychological Disorders: Validation of ASL-Version Psychological Tests

*GRI Investigator:*
*Barbara A. Brauer*

*External Collaborators:*
*W. Grant Dahlstrom and Charles Gelso*
*Univ. of Maryland*

*Project Duration:*
*1985 to present*

*Barbara A. Brauer*

A number of our ASL-version psychological inventories are being pilot-tested in a prevalence study that began in 1985. The pilot study focuses on "demoralization" (one factor in depression) and psychological disorders in a sample of 150 Gallaudet University students. The goal, in addition to obtaining validation data on the test instruments themselves, is to determine the extent to which deaf persons manifest demoralization and to determine if the concept of demoralization provides an "at-risk" linkage to indications of psychological disorders as well.

A sample of 150 deaf Gallaudet students selected from each of the four classes (Freshman through Senior) participated in the study. This sample is considered to be generally representative of the current population of deaf college students in the United States.

The 150 students responded to the following videotaped ASL-version tests: The Psychiatric Epidemiology Research Interview (PERI), a measure of demoralization; the Beck Depression Inventory (BDI), a measure of depressive symptomatology; the Tennessee Self-Concept Scale, and the Minnesota Multiphasic Personality Inventory (MMPI).

This past year we entered all the data into the campus mainframe computer and continued our statistical analyses of this data through multiple regression correlation of test scores, together with a variety of demographic data. We will report on preliminary findings as they emerge.

# Training in the Interpersonal Psychotherapy Approach to Depression

*GRI Investigator:*
*Barbara A. Brauer*

*External Collaborators:*
*Irene Elkin*
*National Institute of Mental Health (NIMH)*
*Eve Chevron*
*Yale Univ.*

*Project Duration:*
*1985 to present*

Training in the Interpersonal Psychotherapy of Depression (IPT) psycho-social approach began with a two-day IPT didactic training workshop. The goal of this workshop was to give Ph.D. psychologists who are working with deaf clients an orientation to one specific, short-term treatment approach for depression and to help these psychologists obtain certification in this approach. Such certification will enable them, in turn, to train other mental health professionals in the deafness field in this specific method of treating depressed clients.

The four participating psychologists were recruited from the Gallaudet University campus. Two were male, two, female; two were deaf, and two, non-deaf. The entire workshop was videotaped for use with future trainees and as a "refresher course" for current trainees.

The next step in the project is supervisory training. This past year we continued consultations with Yale University, the New York State Psychiatric Institute, and the National Institute of Mental Health (NIMH) to develop appropriate screening procedures to recruit deaf depressives for this phase of the project. This past year we also completed a proposal that will be submitted to NIMH for additional grant funding for this project.

# Coping Strategies for Hard of Hearing People and Their Families: An Outreach Program

*GRI Faculty Affiliate:*
*Samuel B. Trychin*
*Dept. of Psychology*

Little attention has been devoted to the psychological and interpersonal problems and concerns of people whose hearing loss occurred in adulthood, especially in terms of adjustment to the hearing loss, the impact the loss has on the family, and strategies to help the hard of hearing person and family members cope with the problems resulting from the hearing loss.

*Samuel B. Trychin*

In response to some of the needs of this population, Gallaudet University, in cooperation with Self Help for Hard of Hearing People, Inc. (SHHH), established the Coping Strategies project in 1985. The project has the overall goal of teaching hard of hearing people and hearing family members (1) how to pinpoint the sources of their communication problems, (2) how to identify non-productive reactions to communication problems, (3) how to use coping strategies and behaviors to solve communication problems themselves, and (4) how obtain resources that may improve the quality of their lives. Although the Coping Strategies project is largely associated with Gallaudet's Department of Psychology, it is also linked to the GRI's Mental Health Research Program, which has supported the development of numerous outreach materials and sponsored activities concerned with promoting effective strategies for coping with hearing loss.

Because so little information existed in 1985 about the needs of this population, we first had to learn from the people themselves the psycho-social issues present in their lives. We identified a wide range of emotional, psychological, and physical difficulties typically experienced by hard of hearing people, including higher than average degrees of suspiciousness, sadness, irritability, withdrawal, anger, anxiety, insecurity, depression, fatigue, inability to relax, and feelings of "not belonging."

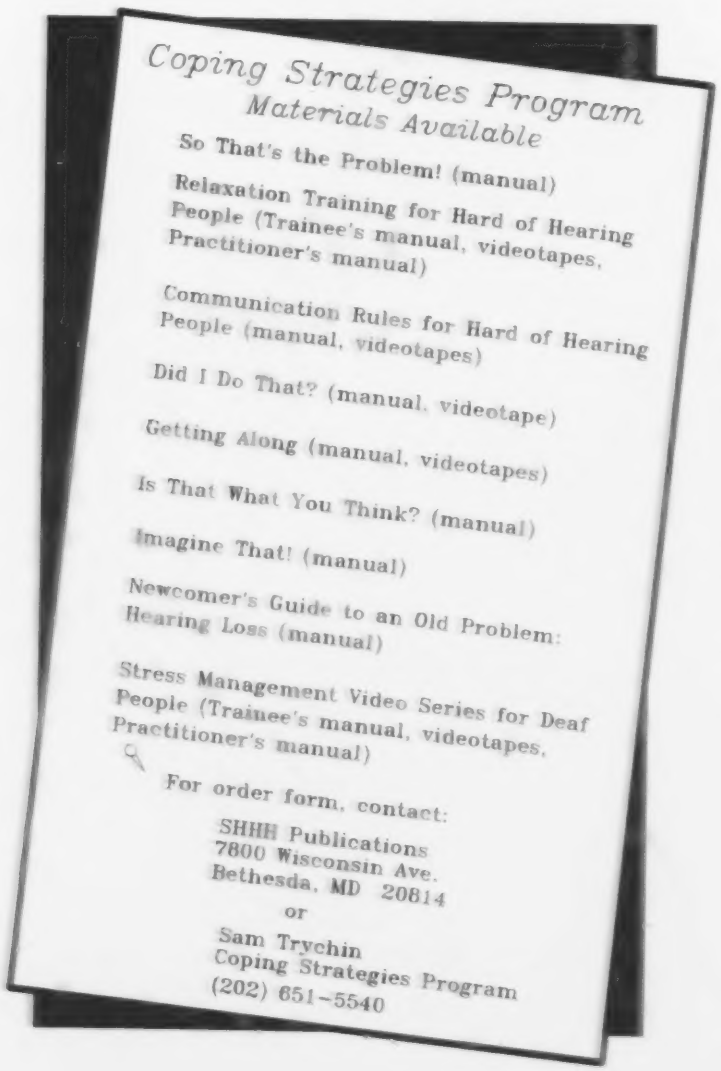
We then developed training materials, in the form of videotapes and manuals, for use with hard of hearing individuals, their families, and professionals working with them. To date, we have produced 16 videotapes and 12 written manuals as part of the Coping Strategies program. We have also developed a training program to teach other professionals how to conduct coping strategies groups and have conducted six such training courses, involving 70 people. Our outreach efforts have resulted in over 70 courses, workshops, and presentations around the country.

The content of the outreach efforts have been developed from two sources: (1) reports on issues and problems by hard of hearing people and their hearing family members, and (2) clinical intervention procedures widely used in clinical practice with other populations. Two major tasks have been to present these clinical procedures within the context of hearing impairment and to translate the basic concepts and procedures into language appropriate for a self-help model. A third task was to develop a format for group presentation that would adopt

a problem-solving focus while capitalizing on the virtues of a self-help group (sharing experiences, mutual support, emotional expressions, and so on).

The components of the model outreach program currently include instruction in stress management techniques for managing the physical and mental tension associated with hearing loss, rules for effective communication that can minimize misunderstanding in a variety of listening situations, practice in applying specific techniques for recognizing and changing behaviors that contribute to interpersonal problems associated with hearing loss, procedures for identifying sources of conflict related to hearing impairment within families and for applying effective problem-solving skills to resolve these conflicts, and hands-on practice with a variety of assistive listening devices useful for improving understanding in social situations and on the telephone.

The number of requests for courses, workshops, and presentations has been steadily increasing and our 1988-89 academic year outreach program is scheduled through June, 1989.



*Coping Strategies Program*
*Materials Available*

So That's the Problem! (manual)

Relaxation Training for Hard of Hearing People (Trainee's manual, videotapes, Practitioner's manual)

Communication Rules for Hard of Hearing People (manual, videotapes)

Did I Do That? (manual, videotape)

Getting Along (manual, videotapes)

Is That What You Think? (manual)

Imagine That! (manual)

Newcomer's Guide to an Old Problem: Hearing Loss (manual)

Stress Management Video Series for Deaf People (Trainee's manual, videotapes, Practitioner's manual)

For order form, contact:

SHHH Publications
7800 Wisconsin Ave.
Bethesda, MD 20814

or

Sam Trychin
Coping Strategies Program
(202) 651-5540

# Scientific Communications Program

*Shawn Davies, Coordinator*

*Faculty/Staff:*
*Robert C. Johnson*
*Dorothy Smith*

In August of 1987, the GRI created a new unit, the Scientific Communications Program (SCP), to intensify its efforts to communicate results of deafness-related research to people who want information in this field. The program expands the responsibilities previously met by the GRI's former Office of Publications. Staff in the SCP produced the GRI's annual reports for both 1986/87 and 1987/88, using the new title, A Tradition of Discovery.

In addition to producing A Tradition of Discovery annually, the SCP publishes the GRI's longstanding newsletter, Research at Gallaudet, an internationally circulated periodical designed to disseminate information about a wide variety of research projects at Gallaudet. SCP staff also prepare articles about research on a regular basis for a number of other Gallaudet publications and work cooperatively with other units on campus to publicize a wide range of GRI-sponsored events and services, both nationally and locally.

Serving as a resource for the GRI's research centers, the program provides editing and technical assistance to researchers presenting research results to various audiences.

In addition to these regular responsibilities, the SCP's special projects this year included co-editing a special issue of Gallaudet Today, entitled "Technology: Changing the Face of Communication and Research" (to which SCP staff contributed a number of articles). Program staff also coordinated many aspects of "Grants Recognition Day," a ceremony in which faculty and staff campus-wide who had generated extramural funding for the University received recognition and helped create a new display on research in the University's Visitors Center. The implementation of a review process for the new GRI Monograph series constituted another of the SCP's significant achievements in 1987/88.

*Shawn Davies*

The SCP staff welcome feedback from you about research projects described in this report and invite you to write to us at the address below if your name is not currently on our Research at Gallaudet mailing list.

**SCIENTIFIC COMMUNICATIONS PROGRAM**
**Gallaudet Research Institute**
**800 Florida Ave., N.E.**
**Washington, DC 20002**

*SCP staff contribute to many Gallaudet publications.*

# The Powrie V. Doctor Chair of Deaf Studies and the Distinguished International Visiting Scholar Program

The Powrie V. Doctor Chair of Deaf Studies was established in 1972 in recognition of the contributions of Powrie Vaux Doctor, a distinguished member of Gallaudet's faculty for 43 years who was also editor of the American Annals of the Deaf from 1948 to 1968 and an internationally known authority on the education of deaf people. Recipients of the Doctor Chair appointment are persons whose research has already contributed much and shows promise of contributing more to knowledge about deaf people and to deaf people's general welfare.

*Harlan Lane shares his perspectives on deafness with GRI research editor, Robert C. Johnson.*

The 1987-88 recipient of the Doctor Chair was Dr. Harlan Lane, Professor of Psychology at Boston's Northeastern University and author of such widely-acclaimed books as When the Mind Hears: A History of the Deaf and The Wild Boy of Aveyron: A History of the Education of Retarded, Deaf and Hearing Children.

Lane pursued several projects while at Gallaudet. One involved examining English literacy among deaf people in preparation for a research project on the topic. Another of Lane's projects involved developing plans for a system of education for the deaf in Burundi, a mountainous country in central Africa that has never formally educated its deaf population. Lane plans to work with the government of Burundi to establish a model bilingual education program there, based on recent findings in linguistics and psychology. In a related project, Lane worked with a number of researchers and educators at Gallaudet to encourage the development of educational systems for deaf people in Third World countries and to begin an international journal on the subject.

Another of Lane's projects was to promote the organization of an international congress on deaf history, with colleagues from countries around the globe convening to display books and give presentations on the histories of deaf people in their own nations.

While in the Doctor Chair, Lane presented several formal and informal lectures on such topics as paternalism, bilingual education, assessment issues, and the "psychology of the deaf." Although Lane devoted much of his time at Gallaudet to the concerns of "culturally deaf" people, he also pursued an interest in acoustical features of speech and hearing, particularly as they affect individuals who lose their hearing later in life, by focusing on changes in speech production that result among previously hearing people who have suddenly become profoundly deaf.

For the past six years, as part of its Distinguished International Visiting Scholars program, the Gallaudet Research Institute has hosted scientists from a number of foreign countries, including England, Israel, Brazil, Australia, and Denmark. Scholars are generally chosen because their work complements that of certain researchers at Gallaudet with whom they often collaborate during their stay. The program provides an excellent mechanism for the exchange of information between Gallaudet's scientific community and deafness-related research abroad.

The 1987-88 Distinguished International Visiting Scholar was Dr. Palle Vestberg, who served as the director of the Royal Copenhagen School for the Deaf in Denmark from 1970-1985. While at Gallaudet, Vestberg studied the influence of parents' interaction and communication with their hearing impaired infants on the development of the infant's personality structure. He concluded that the infants' language and personality development are both deeply affected by the infants' early interactions with parents.

As one of his activities while at Gallaudet, Vestberg studied the research on deafness-related, parent-infant interaction conducted by Dr. Kathryn P. Meadow-Orlans of the GRI's Center for Studies in Education and Human Development (CSEHD). He was involved in the start-up procedures of a new CSEHD study of deaf infants with hearing mothers in which aspects of mother-infant interaction and "infant mastery motivation" are being examined in relation to family stress and support during the infants' first year of life. He also conducted a literature review of stress and support in families with handicapped children and presented an overview of his work to the Gallaudet community.

*Palle Vestberg discusses research issues with Marti Martinez of Gallaudet's International Center on Deafness.*

# The 1987/88 Sponsored Programs Report

# Office of Sponsored Programs

***Stanley M. Matelski, Director***

***Faculty/Staff:***
*Lola M. Gibeily*
*Gwendolyn F. Horton*
*Judith E. Newhouser*

The Office of Sponsored Programs (OSP), a unit within Graduate Studies and Research, provides services and support to Gallaudet faculty and staff seeking outside sponsorship of scholarly projects. The OSP disseminates information concerning possible funding sources and offers guidance in the development of proposals and budgets and in the negotiation and finalization of grants and contracts. In addition, it assists in copyright- and patent- related concerns resulting from externally funded projects and acts as the liaison with the University's Institutional Review Board for the Protection of Human Subjects for projects funded through grants and contracts.

*Stanley M. Matelski*

The OSP is committed to augmenting institutional resources in order to enhance the University's research and educational programming. Through a coordinated effort to match Gallaudet faculty and staff with possible extramural collaborators and sponsors, the OSP functions as a catalyst, transforming the creativity of the Gallaudet community into the reality of funded research, training, and technical assistance projects.

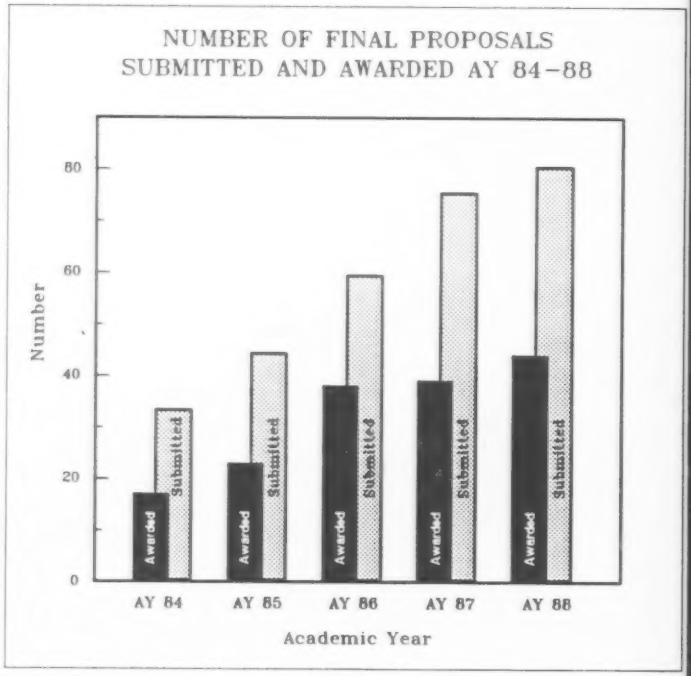
# Sponsored Programs: An Overview 1987/88

*Stanley M. Matelski, Director*

*Faculty/Staff:*
*Lola M. Gibeily*
*Gwendolyn F. Horton*
*Judith E. Newhouser*

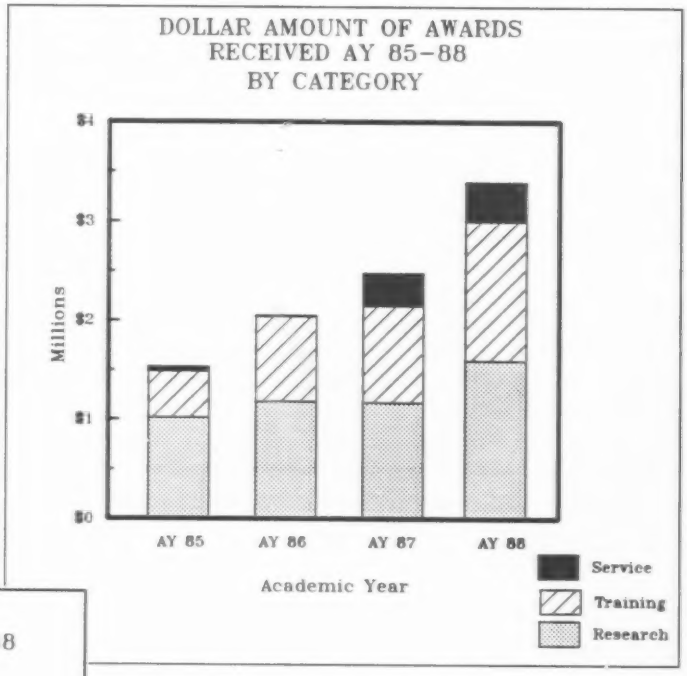
Throughout the campus, Gallaudet faculty and staff actively compete for grants and contracts where sponsored projects are awarded on the basis of rigorous review by colleagues in the field. Such efforts to secure extramural project support have been growing steadily for several years due to a heightened campus awareness of the opportunities for additional resources and of the importance of sponsored projects to the quality of the institution's intellectual life.

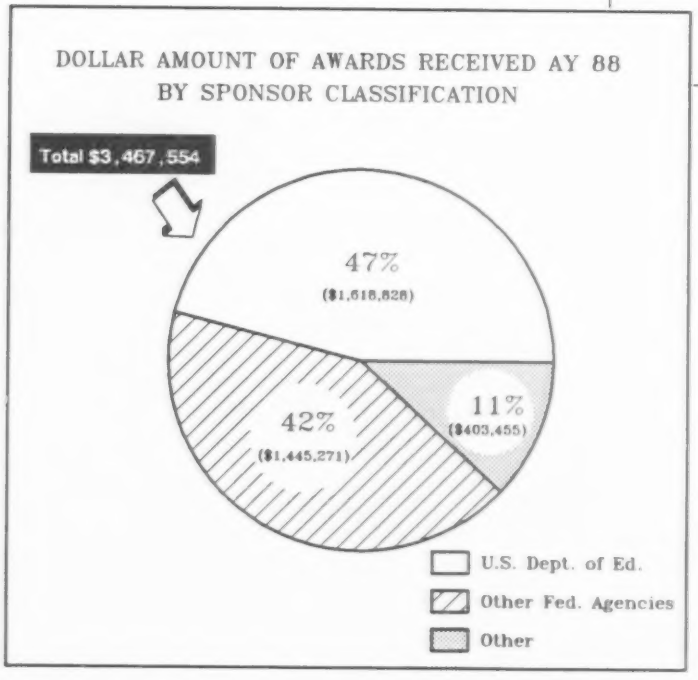
The record of proposals and awards in the last three years shows increased interest in realizing Gallaudet's potential for pursuing valuable research, technical assistance, and training projects. During that time, total University proposal and award activity increased by 88%, while the dollar value of awards more than doubled from $1,526,324 to $3,467,554. Of particular note, however, has been the expanding sponsored research and training activity by faculty and staff outside the core research group in the Gallaudet Research Institute. For the same period, the record shows an even greater advance in proposal and award activity, as the number of proposals submitted by these non-GRI faculty and staff grew from 25 to 53 (112%) and the number of awards received went from 11 to 31 (182%).




This widening participation in the sponsored programs process by the Gallaudet community at large has resulted in a number of significant opportunities for the institution, particularly in establishing cooperative relationships with other major universities, associations, and businesses, such as Carnegie Mellon University, Virginia Commonwealth University, the American Speech-Language-Hearing Association, the American Academy of Otolaryngology, Coulter Associates, Inc., and the Corporation for Public Broadcasting.

The following graphs depict both a five-year summary of proposal and award activity and the recent growth of the dollar level of awards categorized by the traditional university functions of teaching, research and service. A pie chart shows the dollar amount of awards received by sponsor classification. While the U.S. Department of Education remains the largest grantor agency with 47% of the total, other federal agencies and private sources now represent 53%, an increase over last year. The OSP's regular report then provides a detailed, three-year overview of proposal and award activity. In addition, individual proposals and awards are listed for academic year 1987/88.



# Grants and Contracts Awarded
# Academic Year 1987/88

**Marin Allen**, School of Communication, Department of Television, Film and Photography, **$28,500** for the period 7/14/87 through 7/13/88, from the American Academy of Otolaryngology--Head and Neck Surgery Foundation, project entitled "The Deaf Child as Your Patient."

**Thomas Allen**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, **$35,913** for the period 8/1/87 - 11/30/88, from the Department of Health and Human Services, Administration on Aging, project entitled "Current and Future Needs of the Hearing-Impaired Elderly."

**Kathleen Shaver Arnos**, Gallaudet Research Institute, Genetic Services Center, **$27,959** for the period 9/1/87 through 8/31/88, from the National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, through a subcontract with Virginia Commonwealth University, project entitled "Genetic Epidemiology of Diabetes in Rubella Deafness."

**Kathleen Shaver Arnos**, Gallaudet Research Institute, Genetic Services Center, **$273,775** for the period 10/1/87 through 9/30/88, from the Public Health Service, Bureau of Health Care Delivery and Assistance, project entitled "Continuation and Expansion of an Innovative Approach to Genetic Counseling Services for the Deaf Population."

**Trent Batson**, College of Arts and Sciences, English Department, **$165,684** for the period of 8/1/87 through 7/31/88, from The Annenberg/Corporation for Public Broadcasting Project, project entitled "The English Natural Form Instruction Project (ENFI): Computer Networks and the Writing Classroom," performed in consortium with Carnegie-Mellon University, University of Minnesota, New York Institute of Technology, and Northern Virginia Community College.

**Roger Beach**, School of Education and Human Services, Counseling Department, **$69,366** for the period 6/1/88 through 5/31/89 from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Professional Training Program in School Counseling with Hearing-Impaired Children: Summers Only Option."

**Barbara Bodner-Johnson**, School of Education and Human Services, Education Department, **$85,791** for the period 7/1/88 through 6/30/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Preparation Program for Parent-Infant Specialists."

**Patrick Brice**, School of Education and Human Services, Counseling Department, **$64,719** for the period 10/1/87 through 9/30/88, from the Department of Education, Office of Special Education and Rehabilitative Services, projectentitled "Mental Health Counseling of the Hearing Impaired."

**Scott Brown**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, **$91,857** for the period 5/1/88 through 4/30/89, from the National Institutes of Health, National Institute on Aging, project entitled "Aging and the Interaction of Demography and Hearing Loss."

**Timothy Bunnell**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, **$87,491** for the period 8/1/87 through 7/31/88, from the National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke, through a consortium arrangement with the University of Maryland at College Park, project entitled "Speech Enhancement Based on Articulatory Properties of Clear Speech."

**Jimmy Calloway**, School of Education and Human Services, Physical Education and Recreation Department, **$53,101** for the period 9/1/88 through 8/31/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Preservice Training of Therapeutic Recreation Personnel."

**Jimmy Calloway**, School of Education and Human Services, Physical Education and Recreation Department, **$70,475** for the period 6/1/88 through 5/31/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Preparation of Related Services Personnel: Certificate of Paraprofessional Training in Therapeutic Recreation."

**Carol Cober and Ysaye Barnwell**, College of Continuing Education, National Academy, **$113,090** for the period 9/1/87 through 5/31/89, from the Department of Health and Human Services, Office of Human Development Services, Administration on Aging, project entitled "Statewide Training for Nursing Professionals in Community Health Centers: Responding to the Impact of Hearing Loss in Later Life Through Improved Service Delivery to Elderly Clients," in consortium with the American Speech-Language-Hearing Association.

**Paul Cunningham**, College of Arts and Sciences, Biology Department, **$115,000** for the period 9/1/87 through 8/31/88, from the National Science Foundation, project entitled "Microcomputer Technologies in the Facilitation of the Hearing Impaired in the Life Sciences."

**Marita Danek**, School of Education and Human Services, Counseling Department, **$41,486** for the period 9/1/87 through 8/31/88, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Rehabilitation of the Deaf: Long Term Training Project."

**Marita Danek**, School of Education and Human Services, Counseling Department, **$54,392** for the period 9/1/87 through 8/31/88, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Rehabilitation Counseling for the Deaf."

**Gilbert Delgado and Kathleen Shaver Arnos**, School of Education and Human Services, International Center on Deafness, **$9,930** for the period 8/1/87 through 11/30/87, from the Pan American Health Organization, project entitled "Genetic Analysis of Deafness in Population Isolates of Latin America and the Caribbean."

**Loraine DiPietro**, University Relations, National Information Center on Deafness, **$49,840** for the period 9/30/87 through 9/29/88, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Feasibility of Establishing a National Network and Related Data Bases for Information Providers in Hearing Impairment."

**Joan Ehrlich**, College of Continuing Education, Programs in Adult and Community Education, **$39,640** for the period 7/1/87 through 6/30/88, from the District of Columbia Public Schools, project entitled "Adult Basic Education for Hearing Impaired Adults."

**Carol Erting**, Gallaudet Research Institute, Culture and Communication Studies Program, **$20,000** for the period 2/1/88 through 1/31/89, from the Joint Committee for North American/Spanish Educational and Cultural Cooperation, project entitled "United States/Spain Joint Seminars and Exchange Visits: Deaf Children in Integrated Educational Settings."

**Marilyn Farmer and David Schleper**, Model Secondary School for the Deaf, **$4,957** for the period 9/1/88 through 8/31/89, from the Department of Education, Office of Educational Research and Improvement, project entitled "An Interdisciplinary Approach to Applying Recent Research in Literacy in the Education of Hearing Impaired, Learning-Disabled Students."

**Harvey Goodstein**, College of Arts and Sciences, Mathematics and Computer Sciences, **$225,115** for the period 10/1/88 through 9/30/89, from the National Science Foundation, project entitled "Summer Institute in Mathematics and Computer Science for Pre-College Teachers of the Hearing Impaired."

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, **$46,784** for the period 2/1/88 through 1/31/89, from the Department of Education, National Institute on Disability and Rehabilitation Research, through a subcontract with the Lexington Center, project entitled "Rehabilitation Engineering Center on Hearing Technologies."

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, **$149,874** for the period 10/15/87 through 1/14/89, from the Department of Education, National Institute on Disability and Rehabilitation Research, project entitled "Technology for Sensory Devices for Deaf and Severely Hard of Hearing People."

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, **$49,985** for the period 10/15/87 through 1/14/89, from the Department of Education, National Institute on Disability and Rehabilitation Research, project entitled "Technology for Sensory Devices for Deaf and Severely Hard of Hearing People," supplemental funds award.

**Doin Hicks**, Office of the Vice President for Institutional Research, Planning and Evaluation, **$13,440** for the period of 7/1/88 through 6/30/89, from the Council on Education of the Deaf, project entitled "Administrative and Coordination Agreement Between Gallaudet University and the Council on Education of the Deaf."

**Thomas Kluwin**, Gallaudet Research Institute, Center for Studies in Education and Human Development, **$142,229** for the period 6/1/88 through 5/31/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Application of a Process-Oriented Writing Program for Hearing-Impaired Students in Public Schools."

**James Mahshie**, School of Communication, Department of Audiology and Speech-Language Pathology, **$56,232** for the period 9/1/87 through 1/1/89, from the Whitaker Foundation, project entitled "A Computer-based System for Evaluating and Modifying Speech Articulation by the Deaf."

**Jeanne Marquis and Arthur Rochrig**, College of Continuing Education, Hearing and Vision Impaired Program, **$149,910** for the period 7/1/88 through 6/30/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Services to Deaf-Blind Children and Youth: National Information Center on Deaf-Blindness."

**David Martin**, School of Education and Human Services, Office of the Dean, **$51,600** for the period 9/1/87 through 8/31/88, from the Department of Education, Office of Postsecondary Education, project entitled "Gallaudet University's Patricia Roberts Harris Public Service Fellowships Program."

**Kathryn Meadow-Orlans**, Gallaudet Research Institute, Center for Studies in Education and Human Development, **$154,894** for the period 10/1/87 through 9/30/88, from the Public Health Service, Division of Maternal and Child Health and Resources Development, project entitled "Interaction and Support: Mothers and Deaf Infants," performed with the following subcontractors: University of Texas at Dallas, University of Massachusetts at Amherst, Georgia State University, and the University of Pittsburgh.

**Richard Meisegeier**, College of Arts and Sciences, Honors Program, **$61,715** for the period 2/15/88 through 7/31/89, from the National Science Foundation, project entitled "Gallaudet Summer Science Program."

**Diane Merchant**, College of Arts and Sciences, Music Department, **$36,563** for the period 10/1/87 through 4/30/89, from the National Endowment for the Arts, project entitled "Model Curriculum and Symposium: Music and the Education of Hearing-Impaired Children."

**Robert Mobley**, School of Education and Human Services, Education Department, **$108,079** for the period 7/1/88 through 6/30/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Preparation of Special Educators: Gallaudet University Project for the Training of Teachers for the Hearing Impaired and Multihandicapped Hearing Impaired."

**Donald Moores**, Gallaudet Research Institute, Center for Studies in Education and Human Development, **$149,954** for the period 10/1/87 through 9/30/88, from the Department of Education, National Institute of Disability and Rehabilitation Research, project entitled "Dissemination of a Model to Create Least Restrictive Environments for Deaf Students."

**Anne Nissen**, College of Arts and Sciences, Experiential Programs Off Campus, **$32,610** for the period 10/1/87 through 9/30/88, from the Department of Education, Office of Postsecondary Education, Cooperative Education Program, project entitled "Cooperative Education Administration."

**Anne Nissen**, College of Arts and Sciences, Experiential Programs
Off Campus, **$3,767** for the period 10/1/87 through 9/30/88, from the Department of Education, Office of Postsecondary Education, Cooperative Education Program, project entitled "Supplemental Funds Program for Cooperative Education."

**Anne Nissen**, College of Arts and Sciences, Experiential Programs
Off Campus, **$36,892** for the period 5/1/88 through 9/30/88, from the National Aeronautics and Space Administration, project entitled "A Model Summer Program for Handicapped College Students."

**Carol Patrie**, School of Communication, Linguistics and Interpreting Department, **$79,141** for the period 9/1/87 through 8/31/88, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Interpreter Training Program: Training Interpreters for Deaf Individuals."

**Sue Pressman**, Student Affairs, Career Center, **$3,570** for the period 8/30/87 through 8/29/88, from the National Association for Foreign Student Affairs, project entitled "International Student Career Peer Counseling Program for Deaf Post-Secondary Students."

**Brenda Rawlings**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, **$38,500** for the period 9/1/87 through 8/31/88, from the State of Texas Education Agency, project entitled "Texas State Survey of Hearing Impaired Children and Youth."

**John Raymer**, Student Affairs, Student Special Services, **$101,476** for the period 7/1/88 through 8/31/89, from the Department of Education, Office of Postsecondary Education, project entitled "Special Services for Disadvantaged Students."

**Sally Revoile**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, **$178,618** for the period 9/1/87 through 8/31/88, from the National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke, project entitled "Perception of Complex Auditory Stimuli by the Deaf."

**Eli Savanick**, School of Education and Human Services, International Center on Deafness, **$34,348** for the period 6/1/88 through 9/30/88, from the United States Information Agency, project entitled "Building the Communication Bridge Between Deaf and Hearing People: Interpreting and Sign Language Instruction."

**Francine White**, School of Education and Human Services, Counseling Department, **$59,292** for the period 6/1/88 through 5/31/89, from the Department of Education, Office of Special Education and Rehabilitative Services, project entitled "Preparation of Related Services Personnel: Project for the Training of School Counselors for Hearing Impaired Children."

## Grants and Contracts Awarded
(listed by unit/department)

| Unit/Department | AY 87-88 | | AY 86-87 | | AY 85-86 | |
|---|---|---|---|---|---|---|
| | Number of Awards | $ Volume | Number of Awards | $ Volume | Number of Awards | $ Volume |
| **Model Secondary School for the Deaf** | | | | | | |
| Performing Arts | 0 | 0 | 1 | 19,100 | 0 | 0 |
| Sex Education | 0 | 0 | 0 | 0 | 1 | 46,904 |
| Social Studies/English | 1 | 4,957 | 0 | 0 | 0 | 0 |
| **Subtotal** | **1** | **4,957** | **1** | **19,100** | **1** | **46,904** |
| **College of Arts and Sciences** | | | | | | |
| Biology | 1 | 115,000 | 2 | 141,810 | 0 | 0 |
| Chemistry | 0 | 0 | 0 | 0 | 1 | 19,992 |
| English | 1 | 165,684 | 0 | 0 | 0 | 0 |
| Experiential Programs | 3 | 73,269 | 2 | 53,740 | 0 | 0 |
| Honors Program | 1 | 61,715 | 0 | 0 | 0 | 0 |
| Mathematics | 1 | 225,115 | 1 | 193,772 | 1 | 134,116 |
| Music | 1 | 36,563 | 0 | 0 | 0 | 0 |
| Physics | 0 | 0 | 1 | 36,869 | 0 | 0 |
| Psychology | 0 | 0 | 1 | 15,442 | 0 | 0 |
| **Subtotal** | **8** | **677,346** | **7** | **441,633** | **2** | **154,108** |
| **School of Communication** | | | | | | |
| Audiology/Speech-Language Pathology | 1 | 56,232 | 1 | 45,725 | 2 | 69,626 |
| Linguistics/Interpreting | 1 | 79,141 | 1 | 73,851 | 1 | 77,169 |
| TV, Film and Photography | 1 | 28,500 | 0 | 0 | 0 | 0 |
| **Subtotal** | **3** | **163,873** | **2** | **119,576** | **3** | **146,795** |

| Unit/Department | AY 87-88 | | AY 86-87 | | AY 85-86 | |
|---|---|---|---|---|---|---|
| | Number of Awards | $ Volume | Number of Awards | $ Volume | Number of Awards | $ Volume |
| **School of Education and Human Services** | | | | | | |
| Administration/Supervision | 0 | 0 | 0 | 0 | 3 | 68,523 |
| Counseling | 5 | 289,255 | 2 | 105,050 | 8 | 358,211 |
| Education | 2 | 193,870 | 4 | 256,500 | 4 | 330,920 |
| Educational Technology | 0 | 0 | 1 | 100,170 | 2 | 178,297 |
| International Center on Deafness | 2 | 44,278 | 0 | 0 | 0 | 0 |
| Office of the Dean | 1 | 51,600 | 0 | 0 | 0 | 0 |
| Physical Education/Recreation | 2 | 123,576 | 3 | 168,333 | 1 | 34,036 |
| **Subtotal** | **12** | **702,579** | **10** | **630,053** | **18*** | **969,987*** |
| **College of Continuing Education** | | | | | | |
| Hearing and Vision Impaired Program | 1 | 149,910 | 1 | 149,585 | 0 | 0 |
| National Academy | 1 | 113,090 | 0 | 0 | 0 | 0 |
| Programs in Adult and Comm. Ed. | 1 | 39,640 | 1 | 32,846 | 0 | 0 |
| **Subtotal** | **3** | **302,640** | **2** | **182,431** | **0** | **0** |
| **Gallaudet Research Institute** | | | | | | |
| Assessment and Demographic Studies | 3 | 166,270 | 5 | 162,594 | 6 | 241,732 |
| Auditory and Speech Sciences | 2 | 266,109 | 2 | 271,846 | 1 | 30,462 |
| Culture and Communication Studies | 1 | 20,000 | 0 | 0 | 0 | 0 |
| Education and Human Development | 3 | 447,077 | 1 | 153,728 | 2 | 211,350 |
| Genetic Services | 2 | 301,734 | 3 | 158,480 | 2 | 157,923 |
| Technology Assessment Program | 3 | 246,643 | 3 | 183,978 | 1 | 35,700 |
| **Subtotal** | **14** | **1,447,833** | **14** | **930,626** | **12** | **677,167** |

| Unit/Department | AY 87-88 | | AY 86-87 | | AY 85-86 | |
|---|---|---|---|---|---|---|
| | Number of Awards | $ Volume | Number of Awards | $ Volume | Number of Awards | $ Volume |
| **Student Affairs** | | | | | | |
| Career Center | 1 | 3,570 | 0 | 0 | 0 | 0 |
| Student Special Services | 1 | 101,476 | 1 | 76,112 | 0 | 0 |
| **Subtotal** | **2** | **105,046** | **1** | **76,112** | **0** | **0** |
| **Computer Center** | **0** | **0** | **1** | **20,000** | **0** | **0** |
| **Institutional Research, Planning and Evaluation** | **1** | **13,440** | **0** | **0** | **0** | **0** |
| **Learning Center** | **0** | **0** | **0** | **0** | **1** | **37,469** |
| **National Information Center on Deafness** | **1** | **49,840** | **0** | **0** | **0** | **0** |
| **Physical Plant** | **0** | **0** | **1** | **52,861** | **1** | **13,671** |
| **TOTAL** | **45** (+15%) | **3,467,554** (+40%) | **39** (+3%) | **2,472,392** (+21%) | **38** (+65%) | **2,046,101** (+34%) |

* Includes five awards totaling $281,100 awarded in AY 85-86, but for the project period occurring in AY 86-87.

# Final Proposals Submitted
# Academic Year 1987/88

**Marin Allen**, School of Communication, Department of Television, Film and Photography, project entitled "Initial Series of F*A*N*T*A*S*T*I*C!" to the Corporation for Public Broadcasting in the amount of **$368,369** for 1 year.

**Marin Allen**, School of Communication, Department of Television, Film and Photography, project entitled "Planning Project for Satellite Teleconferencing Capability" to the Department of Commerce in the amount of **$34,207** for 6 months.

**Thomas Allen**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Development of a Criterion-Referenced Reading Inventory for Diagnosing Reading Difficulties of Elementary-Aged Hearing Impaired Students" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$556,103** for 5 years.

**Thomas Allen**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "A Proposal to Link Cross-Sectional Data to Perform a Longitudinal Analysis of the Educational and Vocational Progress of Hearing Impaired Students" to the Educational Testing Service in the amount of **$20,460** for 1 year.

**Kathleen Shaver Arnos**, Gallaudet Research Institute, Genetic Services Center, project entitled "Continuation and Expansion of an Innovative Approach to Genetic Counseling Services for the Deaf Population" to the Public Health Service, Bureau of Health Care Delivery and Assistance in the amount of **$220,717** for 1 year (continuation).

**Kathleen Shaver Arnos**, Gallaudet Research Institute, Genetic Services Center, project entitled "Genetic Epidemiology of Diabetes in Rubella Deafness" through Virginia Commonwealth University to the National Institute of Diabetes and Digestive and Kidney Diseases in the amount of **$29,821** for 1 year (continuation).

**Kathleen Shaver Arnos**, Gallaudet Research Institute, Genetic Services Center, project entitled "Molecular Markers and Genetic Epidemiology of Deafness" through Virginia Commonwealth University to the National Institutes of Health, in the amount of **$698,625** for 5 years.

**Kathleen Shaver Arnos**, Gallaudet Research Institute, Genetic Services Center, project entitled "Molecular Markers and Genetic Epidemiology of Deafness" through Virginia Commonwealth University to the National Institutes of Health in the amount of **$416,251** for 3 years (revision).

**James Barrie**, Model Secondary School for the Deaf, Social Studies Department, project entitled "Constitutional Rights Today: Their Relationship to the Philosophical and Historical Origins of the U.S. Constitution" to the Department of Education, Secretary's Discretionary Program in the amount of **$68,863** for 18 months.

**Trent Batson**, College of Arts and Sciences, English Department, project entitled "Literacy for Deaf Children: ENFI Jr." to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$174,857** for 18 months.

**Roger Beach**, School of Education and Human Services, Counseling Department, project entitled "Professional Training Program in School Counseling with Hearing-Impaired Children: Summers Only Option" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$216,992** for 3 years.

**Lynne Bernstein**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Speech Perception Studies: Biomodal and Developmental" to the National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke in the amount of **$151,200** for 3 years. Research Career Development Award.

**Lynne Bernstein**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Novel Systems for Speech Processing and Haptic Encoding" through Johns Hopkins University to the National Science Foundation in the amount of **$138,278** for 3 years.

**Lynne Bernstein**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Cutaneous Communication Aids for the Deaf" to the National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke in the amount of **$614,326** for 5 years (competing continuation for new program cycle).

**Barbara Bodner-Johnson and Thomas Jones**, School of Education and Human Services, Education Department, project entitled "Preparation Program for Parent-Infant Specialists" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$91,081** for 1 year (continuation).

**Patrick Brice**, School of Education and Human Services, Counseling Department, project entitled "Mental Health Counseling of the Hearing Impaired" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$308,683** for 3 years.

**Patrick Brice**, School of Education and Human Services, Counseling Department, project entitled "Mental Health Counseling of the Hearing Impaired" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$68,472** for 1 year (continuation).

**Scott Brown**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Older Americans and Tinnitus: A Demographic Study" to the AARP Andrus Foundation in the amount of **$50,000** for 1 year.

**Scott Brown**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Older Americans and Tinnitus: A Demographic Study" to the AARP Andrus Foundation in the amount of **$50,000** for 1 year (revision).

**Scott Brown**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Aging and the Interaction of Demography and Hearing Loss" to the National Institutes of Health, National Institute on Aging in the amount of **$99,485** for 1 year (continuation).

**Timothy Bunnell**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Speech Enhancement Based on Articulatory Properties of Clear Speech," consortium proposal with the University of Maryland at College Park to the National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke in the amount of **$92,474** for 1 year. (continuation)

**Jimmy Calloway**, School of Education and Human Services, Physical Education and Recreation Department, project entitled "The Effects of a Structured Walking Program on the Psycho-Social and Physiological Well-Being of the Hearing and Deaf, Frail Elderly" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$328,488** for 3 years.

**Jimmy Calloway**, School of Education and Human Services, Physical Education and Recreation Department, project entitled "Preservice Training of Therapeutic Recreation Personnel" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$53,101** for 1 year (continuation).

**Jimmy Calloway**, School of Education and Human Services, Physical Education and Recreation, project entitled "Preparation of Related Services Personnel: Certificate of Paraprofessional Training in Therapeutic Recreation" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$76,267** for 1 year (continuation).

**Carol Cober and Karen Semanchik**, College of Continuing Education, National Academy, project entitled "Short-Term Training in Hearing and Vision Loss For State of Virginia Nursing Home Administrators" through the Pennsylvania College of Optometry to the Department of Health and Human Services, Office of Human Development Services, in the amount of **$40,441** for 17 months.

**Carol Cober and Karen Semanchik**, College of Continuing Education, National Academy, project entitled "National Resource Center on Elders With Visual, Hearing, Developmental and Communication Impairments" through the University of Maryland Center on Aging to the Department of Health and Human Services, Office of Human Development Services, Administration on Aging in the amount of **$157,538** for 3 years.

**Marita Danek**, School of Education and Human Services, Counseling Department, project entitled "Long Term Training: Rehabilitation of the Deaf" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$144,276** for 3 years.
**Janet Droge**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Phonemic Awareness and Speech Perception in Hearing-Impaired Subjects" to the Deafness Research Foundation in the amount of **$9,238** for 2 months.

**Francis Duffy**, School of Education and Human Services, Administration and Supervision, project entitled "A Preservice Training Program for Supervisors in Deaf and Special Education" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$138,700** for 3 years.

**Joan Ehrlich**, College of Continuing Education, Programs in Adult and Community Education, project entitled "Adult Basic Education Literacy Program" to the District of Columbia Public Schools in the amount of **$41,080** for 1 year.

**Joan Ehrlich**, College of Continuing Education, Programs in Adult and Community Education, project entitled "Adult Basic Education for Hearing Impaired Adults" to the District of Columbia Public Schools in the amount of **$39,640** for 1 year.

**Carol Erting**, Gallaudet Research Institute, Culture and Communication Studies Program, project entitled "United States/Spain Joint Seminars and Exchange Visits: Deaf Children in Integrated Educational Settings" to the Joint Committee for North American/Spanish Educational and Cultural Cooperation in the amount of **$27,000** for 1 year.

**Marilyn Farmer and David Schleper**, Model Secondary School for the Deaf, Social Studies and English Departments, project entitled "An Interdisciplinary Approach to Applying Recent Research in Literacy in the Education of Hearing Impaired, Learning-Disabled Students" to the Department of Education, Office of Educational Research and Improvement in the amount of **$4,957** for 1 year.

**Harvey Goodstein**, College of Arts and Sciences, Mathematics and Computer Science Department, project entitled "Summer Institute in Mathematics and Computer Science for Pre-College Teachers of the Hearing Impaired" to the National Science Foundation in the amount of **$225,115** for 15 months (continuation).

**Gerilee Gustason**, School of Education and Human Services, Education Department, project entitled "Validity and Reliability of Sign Evaluation Processes for Teachers and Educational Interpreters" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$138,493** for 3 years.

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, project entitled "Rehabilitation Engineering Center on Hearing Technologies" through the Lexington Center to the Department of Education, National Institute on Disability and Rehabilitation Research in the amount of **$249,785** for 5 years.

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, project entitled "Rehabilitation Engineering Center on Evaluation of Rehabilitation Technologies/Evaluation of Technology for Persons with Hearing Impairments" through Helen Hayes Hospital to the Department of Education, National Institute on Disability and Rehabilitation Research in the amount of **$353,822** for 5 years.

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, project entitled "Technology for Sensory Devices for Deaf and Severely Hard of Hearing People" to the Department of Education, National Institute on Disability and Rehabilitation Research in the amount of **$50,413** for 1 year (supplemental funds request).

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, project entitled "A Robotic Fingerspelling Hand for Deaf-Blind Communication" to the Department of Education, National Institute for Disability and Rehabilitation Research, in cooperation with Oaktree Automation Corporation, in the amount of **$311,410** for 3 years.

**Judith Harkins**, Gallaudet Research Institute, Technology Assessment Program, project entitled "Technology for Sensory Devices For Deaf and Severely Hard of Hearing People" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$149,874** for 1 year (continuation).

**Judith Harkins and Carl Jensema**, Gallaudet Research Institute, Technology Assessment Program, project entitled "Feature Extraction Methods for Development of a Visual Telephone" through the University of Delaware to the Department of Education, National Institute on Disability and Rehabilitation Research in the amount of **$108,586** for 3 years.

**Judith Holt**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Design of Measures to Assess AIDS Education for Children" to the National Institutes of Health in the amount of **$920,097** for 5 years.

**Harriet Kaplan**, School of Communication, Department of Audiology and Speech-Language Pathology, project entitled "Electroacoustic and Clinical Protocols for Evaluating Assistive Listening Devices" to the Department of Education, National Institute for Disability and Rehabilitation Research in the amount of **$294,299** for 3 years.

**Harriet Kaplan**, School of Communication, Department of Audiology and Speech-Language Pathology, project entitled "Evaluation Protocols for Assistive Listening Devices" to the National Institutes of Health in the amount of **$334,170** for 3 years.

**Cynthia King**, School of Education and Human Services, Education Department, project entitled "Research Trends Related to the Education of Hearing Impaired Individuals" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$187,421** for 2 years.

**Thomas Kluwin**, Gallaudet Research Institute, Center for Studies in Education and Human Development, project entitled "Application of a Process-Oriented Writing Program for Hearing-Impaired Students in Public Schools" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$142,229** for 1 year (continuation).

**Scott Liddell**, School of Communication, Department of Linguistics and Interpreting, project entitled "Spatial Systems in American Sign Language" to the National Science Foundation in the amount of **$189,376** for 2 years.

**Ceil Lucas**, School of Communication, Department of Linguistics and Interpreting, project entitled "Conference: Theoretical Issues in Sign Language Research II" to the D.C. Community Humanities Council in the amount of **$1,500** for short term support.

**Ceil Lucas**, School of Communication, Department of Linguistics and Interpreting, project entitled "Language Contact in the Deaf Community" to the National Science Foundation in the amount of **$76,911** for 15 months.

**James Mahshie**, School of Communication, Department of Audiology and Speech-Language Pathology, project entitled "Articulatory Determinants of Clear Speech and Characterization of Speech Articulation by Deaf Speakers" to the University of Wisconsin in the amount of **$1,544** for 3 weeks.

**David Martin**, School of Education and Human Services, Office of the Dean, project entitled "Gallaudet University's Patricia Roberts Harris Public Service Fellowships Program" to the Department of Education, Office of Postsecondary Education in the amount of **$64,500** for 1 year.

**David Martin**, School of Education and Human Services, Office of the Dean, project entitled "Gallaudet University's Patricia Roberts Harris Public Service Fellowships Program for 1988-89" to the Department of Education, Office of Postsecondary Education in the amount of **$129,000** for 1 year.

**Kenneth Massie**, Administration and Business Affairs, Physical Plant Department, project entitled "Energy Conservation Measures for the Model Secondary School for the Deaf" to the District of Columbia Energy Office in the amount of **$9,261** for 16 months.

**Kathryn Meadow-Orlans**, Gallaudet Research Institute, Center for Studies in Education and Human Development, project entitled "Interaction and Support: Mothers and Deaf Infants" to the Public Health Service, Division of Maternal and Child Health and Resources Development in the amount of **$167,740** for 1 year (continuation).

**Richard Meisegeier**, College of Arts and Sciences, Honors Program, project entitled "Gallaudet Summer Science Program" to the National Science Foundation in the amount of **$64,255** for 1 year.

**Diane Merchant**, College of Arts and Sciences, Music Department, project entitled "Innovative Video Curricular Materials and Preservice Course on Music for Hearing Impaired Children and Youth" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$139,386** for 3 years.

**Diane Merchant**, College of Arts and Sciences, Music Department, project entitled "D.C. Percussion Artists' Performance and Clinic for Students" to the D.C. Commission on the Arts and Humanities in the amount of **$6,290** for 6 1/2 months.

**Robert Mobley**, School of Education and Human Services, Education Department, project entitled "Gallaudet University Project for the Training of Teachers for the Hearing Impaired and the Multihandicapped Hearing Impaired" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$112,014** for 1 year (continuation).

**Donald Moores**, Gallaudet Research Institute, Center for Studies in Education and Human Development, project entitled "Dissemination of a Model to Create Least Restrictive Environments for Deaf Students" to the Department of Education, National Institute for Disability and Rehabilitation Research in the amount of **$165,441** for 1 year (continuation).

**Mary June Moseley**, School of Communication, Audiology and Speech-Language Pathology Department, project entitled "Visual Speech Display as an Articulation Training Aid for the Deaf" through Old Dominion University to the National Institutes of Health in the amount of **$65,191** for 3 years.

**Mary June Moseley**, School of Communication, Audiology and Speech-Language Pathology Department, project entitled "Visual Speech Display as an Articulation Training Aid for the Deaf" through Old Dominion University to the National Science Foundation in the amount of **$14,700** for 2 years.

**Catherine Moses**, College of Arts and Sciences, Sociology and Social Work Department, project entitled "A Curriculum for a Specialization in Gerontology and Hearing Impairment for a Master's Degree in Social Work at Gallaudet University" to the Office of Human Development Services, Administration on Aging in the amount of **$100,965** for 17 months.

**Anne Nissen**, College of Arts and Sciences, Experiential Programs Off Campus, project entitled "Cooperative Education Program for the School of Management" to the Department of Education, Cooperative Education Program in the amount of **$360,065** for 5 years.

**Anne Nissen**, College of Arts and Sciences, Experiential Programs Off Campus, project entitled "Cooperative Education Program" to the Department of Education, Office of Postsecondary Education in the amount of **$33,588** for 1 year.

**Anne Nissen**, College of Arts and Sciences, Experiential Programs Off Campus, project entitled "Supplemental Funds to Initiate, Improve, or Expand a Program of Cooperative Education" to the Department of Education, Office of Postsecondary Education in the amount of **$3,767** for 1 year.

**Anne Nissen**, College of Arts and Sciences, Experiential Programs Off Campus, project entitled "A Model Summer Program for Handicapped College Students" to the National Aeronautics and Space Administration in the amount of **$36,892** for 10 months.

**Ronald Nomeland**, School of Education and Human Services, Educational Technology Department, project entitled "Training of Specialists in Educational Technology: Special Education/Deafness: Regular and Summers Only Options" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$620,817** for 5 years.

**Njeri Nuru**, School of Communication, Office of the Dean, project entitled "Multicultural Aspects of Deafness: Analysis Service and Instruction--Focus on the Culture of India (MADASI-MADRAS)" to the Smithsonian Foreign Currency Program in the amount of **$71,754** for 1 year.

**Carol Patrie**, School of Communication, Department of Linguistics and Interpreting, project entitled "Interpreter Training for the Deaf" to the Department of Education, Rehabilitation Services Administration in the amount of **$79,576** for 1 year (continuation).

**Janet Pray**, College of Arts and Sciences, Sociology and Social Work Department, project entitled "Improvements of Child Welfare Services for Hearing Impaired Clients through the Training of Deaf Professionals" to the Office of Human Development Services, Administration for Children, Youth and Families in the amount of **$40,000** for 2 years.

**Brenda Rawlings**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Texas State Survey of Hearing Impaired Children and Youth" to the Texas Education Agency in the amount of **$38,500** for 1 year.

**John Raymer**, Student Affairs, Student Special Services Department, project entitled "Special Services for Disadvantaged Students" to the Department of Education, Office of Postsecondary Education in the amount of **$80,566** for 1 year (continuation).

**Sally Revoile**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Perception of Complex Auditory Stimuli by the Deaf" to the National Institutes of Health, National Institute of Neurological and Communicative Disorders and Stroke, in the amount of **$188,909** for 1 year (continuation).

**Arthur Roehrig**, College of Continuing Education, Hearing and Vision Impaired Program, project entitled "National Information Center on Deaf-Blindness" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$160,420** for 1 year (continuation).

**Eli Savanick**, School of Education and Human Services, International Center on Deafness, project entitled "Building the Communication Bridge between Deaf and Hearing People: Interpreting and Sign Language Instruction" to the United States Information Agency, Office of Private Sector Programs in the amount of **$28,834** for 2 months.

**Gail Solit**, Administration and Business Affairs, Child Development Center, project entitled "Demonstration Project to Integrate Hearing and Hearing Impaired in Day Care Centers" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$332,869** for 3 years.

**Alice Suter**, Gallaudet Research Institute, Center for Auditory and Speech Sciences, project entitled "Proposal to Assess the Field Attenuation of the 3M 6300 Earplug" to the 3M Company in the amount of **$79,989** for 11 months.

**Walter Trafton**, College of Arts and Sciences, Chemistry Department, project entitled "Computerization of Spectrophotometry Across the Curriculum" to the National Science Foundation in the amount of **$25,434** for 2 years.

**Raymond Trybus**, Graduate Studies and Research, project entitled "Research and Training Center on Mental Health Rehabilitation of Deaf Persons to be Established by Gallaudet University" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$3,731,232** for 5 years.

**Francine White**, School of Education and Human Services, Counseling Department, project entitled "Preparation of Related Services Personnel: Gallaudet University Project for the Training of School Counselors for Hearing Impaired Children" to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$61,664** for 1 year (continuation).

**Robert Zambrano**, College of Arts and Sciences, English Department, project entitled "Using Artificial Intelligence to Overcome Limited English Proficiency" through Georgetown University to the Department of Education, Fund for the Improvement of Postsecondary Education in the amount of **$110,780** for 3 years.

**Robert Zambrano**, College of Arts and Sciences, English Department, project entitled "Using Artificial Intelligence to Teach English to Deaf People" through Georgetown University to the Department of Education, Office of Special Education and Rehabilitative Services in the amount of **$63,299** for 18 months.

**Final Proposals Submitted**
(listed by unit/department)

| Unit/Department | AY 87-88 | | AY 86-87 | | AY 85-86 | |
|---|---|---|---|---|---|---|
| | Number of Proposals | $ Volume | Number of Proposals | $ Volume | Number of Proposals | $ Volume |
| **Model Secondary School for the Deaf** | | | | | | |
| English/Social Studies | 1 | 4,957 | 0 | 0 | 0 | 0 |
| Instruction | 0 | 0 | 1 | 10,000 | 0 | 0 |
| Performing Arts | 0 | 0 | 0 | 0 | 1 | 93,303 |
| Sex Education | 0 | 0 | 0 | 0 | 1 | 73,988 |
| Social Studies | 1 | 68,863 | 0 | 0 | 0 | 0 |
| **Subtotal** | **2** | **73,820** | **1** | **10,000** | **2** | **167,291** |
| **College of Arts and Sciences** | | | | | | |
| Biology | 0 | 0 | 2 | 139,572 | 1 | 318,203 |
| Chemistry | 1 | 25,434 | 1 | 21,796 | 1 | 19,992 |
| English | 3 | 348,936 | 3 | 521,899 | 1 | 374,667 |
| Experiential Programs | 4 | 434,312 | 1 | 3,140 | 1 | 50,623 |
| Government | 0 | 0 | 1 | 8,000 | 0 | 0 |
| Honors Program | 1 | 64,255 | 0 | 0 | 0 | 0 |
| Mathematics | 1 | 225,115 | 0 | 0 | 1 | 316,741 |
| Music | 2 | 145,676 | 2 | 172,303 | 0 | 0 |
| Physics | 0 | 0 | 1 | 36,869 | 0 | 0 |
| Psychology | 0 | 0 | 1 | 15,442 | 0 | 0 |
| Sociology/Social Work | 2 | 140,965 | 0 | 0 | 1 | 100,286 |
| **Subtotal** | **14** | **1,384,693** | **12** | **919,021** | **6** | **1,180,512** |

| Unit/Department | AY 87-88 | | AY 86-87 | | AY 85-86 | |
|---|---|---|---|---|---|---|
| | Number of Proposals | $ Volume | Number of Proposals | $ Volume | Number of Proposals | $ Volume |
| **School of Communication** | | | | | | |
| Audiology/Speech-Language Pathology | 5 | 709,904 | 5 | 984,721 | 2 | 100,000 |
| Linguistics/Interpreting | 4 | 347,363 | 2 | 94,559 | 2 | 208,247 |
| Office of the Dean | 1 | 71,754 | 0 | 0 | 0 | 0 |
| TV, Film and Photography | 2 | 402,576 | 0 | 0 | 1 | 176,841 |
| **Subtotal** | **12** | **1,531,597** | **7** | **1,079,280** | **5** | **485,088** |
| **School of Education and Human Services** | | | | | | |
| Administration/Supervision | 1 | 138,700 | 2 | 348,003 | 3 | 147,731 |
| Counseling | 5 | 800,087 | 4 | 329,252 | 5 | 556,884 |
| Education | 4 | 529,009 | 4 | 589,452 | 3 | 605,996 |
| Educational Foundations/Research | 0 | 0 | 4 | 132,646 | 1 | 318,760 |
| Educational Technology | 1 | 620,817 | 3 | 192,630 | 1 | 108,691 |
| International Center on Deafness | 1 | 28,834 | 1 | 9,930 | 0 | 0 |
| Office of the Dean | 2 | 193,500 | 0 | 0 | 0 | 0 |
| Physical Education/Recreation | 3 | 457,856 | 4 | 641,803 | 1 | 44,758 |
| **Subtotal** | **17** | **2,768,803** | **22** | **2,243,716** | **14** | **1,782,820** |
| **College of Continuing Education** | | | | | | |
| Hearing and Vision Impaired Program | 1 | 160,420 | 1 | 464,056 | 0 | 0 |
| National Academy | 2 | 197,979 | 1 | 113,090 | 1 | 94,157 |
| Programs in Adult and Comm. Ed. | 2 | 80,720 | 2 | 76,660 | 0 | 0 |
| **Subtotal** | **5** | **439,119** | **4** | **653,806** | **1** | **94,157** |

| Unit/Department | AY 87-88 | | AY 86-87 | | AY 85-86 | |
|---|---|---|---|---|---|---|
| | Number of Proposals | $ Volume | Number of Proposals | $ Volume | Number of Proposals | $ Volume |
| **Gallaudet Research Institute** | | | | | | |
| Assessment and Demographic Studies | 7 | 1,734,645 | 7 | 1,524,793 | 8 | 849,340 |
| Auditory and Speech Sciences | 7 | 1,274,414 | 3 | 340,154 | 4 | 1,130,013 |
| Culture and Communication Studies | 1 | 27,000 | 0 | 0 | 0 | 0 |
| Education and Human Development | 3 | 475,410 | 4 | 1,971,088 | 5 | 872,874 |
| Genetic Services | 4 | 1,365,414 | 4 | 702,269 | 2 | 38,204 |
| Office of the Dean | 1 | 3,731,232 | 1 | 496,366 | 2 | 190,909 |
| Technology Assessment Program | 6 | 1,223,890 | 2 | 93,586 | 6 | 762,396 |
| **Subtotal** | **29** | **9,832,005** | **21** | **5,128,256** | **27** | **3,843,736** |
| **School of Preparatory Studies** | **0** | **0** | **3** | **257,480** | **1** | **150,824** |
| **Student Affairs** | | | | | | |
| Career Center | 0 | 0 | 2 | 118,219 | 0 | 0 |
| Student Special Services | 1 | 80,566 | 1 | 358,105 | 0 | 0 |
| **Subtotal** | **1** | **80,566** | **3** | **476,324** | **0** | **0** |
| **Child Development Center** | **1** | **332,869** | **0** | **0** | **0** | **0** |
| **Computer Center** | **0** | **0** | **0** | **0** | **1** | **48,176** |
| **Learning Center** | **0** | **0** | **0** | **0** | **1** | **37,469** |
| **National Information Center on Deafness** | **0** | **0** | **1** | **49,840** | **0** | **0** |
| **Physical Plant** | **1** | **9,261** | **1** | **63,436** | **1** | **13,671** |
| **TOTAL** | **82** (+9%) | **16,452,733** (+51%) | **75** (+27%) | **10,881,159** (+39%) | **59** (+34%) | **7,803,744** (+152%) |

# Preliminary Proposals Submitted
# Academic Year 1987/88

In addition to the 82 final proposals submitted, another five with a total dollar value of $600,884 were submitted as preliminary letters, applications, or proposals.

**Marin Allen**, School of Communication, Department of Television, Film and Photography, project entitled "The Development of Effective Guidelines for the Use of Captioned Materials in the Classroom" to the Department of Education, Fund for the Improvement of Postsecondary Education in the amount of **$97,611** for 19 months.

**Thomas Allen**, Gallaudet Research Institute, Center for Assessment and Demographic Studies, project entitled "Development of a Hearing Impaired Supplement to the National Education Longitudinal Study" to the Spencer Foundation in the amount of **$263,412** for 3 years.

**Trent Batson**, College of Arts and Sciences, English Department, project entitled "A New Context For Invention: Computer Network in the Writing Classroom" to the Department of Education, Fund for the Improvement of Postsecondary Education in the amount of **$214,871** for 3 years.

**Carol Erting**, Gallaudet Research Institute, Culture and Communication Studies Program, project entitled "THE DEAF WAY: Plenary Sessions" to the Wenner-Gren Foundation in the amount of **$20,000** for conference support.

**Njeri Nuru**, School of Communication, Office of the Dean, project entitled "DEAF CULTURE INTERNATIONAL: InterNET...Seminars in Cultural Aspects of Deafness" to the National Association for Foreign Student Affairs in the amount of **$4,990** for 1 year.

# 1987/88 Publications of Research Institute Personnel

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Allen, T.E. (Ed.). Handicapped youth and the outcomes of their schooling: Recent research advances in the United States [Special issue]. International Journal of Educational Research, in press.

Allen, T.E. Staying, leaving and graduating: Enrollment patterns among deaf high schoolers. In T.E. Allen, B.W. Rawlings, & A.N. Schildroth (Eds.), Deaf students in transition from school to work. Baltimore, MD: Paul H. Brookes Publishing Company, in press.

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Allen, T.E., Rawlings, B.W., & Schildroth, A.N. (Eds.). Deaf students in transition from school to work. Baltimore, MD: Paul H. Brookes Publishing Company, in press.

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Allen, T.E. & Woodward, J.C. Teacher characteristics and the degree to which teachers incorporate features of English in their sign communication with hearing impaired students. American Annals of the Deaf, 132, 61-67, 1987.

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Deyo, D. Amplification and assistive devices for hearing impaired children. In L. DiPietro (Ed.), Growing together: Information for parents of hearing impaired children. Washington, DC: National Information Center on Deafness, Gallaudet University, 1987.

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Deyo, D. & Gelzer, L. Accepting the hearing impaired child in the family. In L. DiPietro (Ed.), Growing together: Information for parents of hearing impaired children. Washington, DC: National Information Center on Deafness, Gallaudet University, 1987.

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# 1987/88 Presentations of Research Institute Personnel

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Allen, T.E. Demographic trends: Deaf children and adults. Presentation made at the Annual Conference on Services for Deaf Mississippians, Jackson, MS, August 1987.

Allen, T.E. Testing and assessment issues. Presentation at the Postsecondary Education for Hearing Impaired Persons Midwest Regional Conference, DeKalb, IL, October 1987.

Allen, T.E. Everything you always wanted to know about the Stanford Achievement Test. Presentation at the Northeast Regional Conference, Princeton, NJ, March 1988.

Allen, T.E. Educational placement and demographic factors. Presentation at the United States/Spain Joint Seminar and Exchange Visit: Deaf children in integrated settings. Washington, DC, April 1988.

Allen, T.E. Interpreting Stanford scores. Presentation at the annual meeting of the Conference of Educational Administrators Serving the Deaf, Providence, RI, April 1988.

Allen, T.E. Who are the children in mainstream settings? A demographic profile of students in different types of programs. Presentation at Gallaudet Research Institute Mainstreaming Roundtable, Washington, DC, April 1988.

Arnos, K.S. (formerly Shaver K.A.) Genetic syndromes involving deafness and the genetic counseling process. Presentation at a meeting of the American Deafness and Rehabilitation Association (ADARA), Greenbelt, MD, November 1987.

Arnos, K.S. Medical and psychological implications of rubella and other syndromes. Workshop given for the Mental Health and Deafness Workshop, sponsored by the Gallaudet Regional Center at Northern Essex Community College, North Falmouth, MA, November 1987.

Arnos, K.S. A model for the provision of genetic services to the deaf--The Gallaudet University Genetic Services Program. Presentation at the Genetics and Hearing Impairment Symposium, sponsored by Gallaudet University, the Mid-Atlantic Regional Human Genetics Network, and the Greater Baltimore Medical Center, Baltimore, MD, January 1988.

Arnos, K.S. The Gallaudet Genetic Services Center. Presentation at the Genetics and Deafness Workshop, sponsored by the Royal National Institute for the Deaf, London, England, February 1988.

Arnos, K.S. Genetic aspects of hearing impairment. Presentation at the annual convention of the Speech and Hearing Association of Virginia, Roanoke, VA, March 1988.

Arnos, K.S. Teenage pregnancy and birth defects. Presentation at the Teenage Sexuality Workshop, sponsored by the March of Dimes of Hampshire County, held at the West Virginia School for the Deaf and the Blind, Romney, WV, May 1988.

Arnos, K.S. & Downs, K. Genetics and hearing impairment: Medical and cultural implications. Presentation at the Genetics and Hearing Impairment Workshop, sponsored by the Children's Medical Center, Tulsa, OK, January 1988.

Arnos, K.S. & Downs, K. Genetics and deafness: Medical and cultural implications. Workshop for the Gallaudet Regional Center, Eastfield College, held at the Deaf Outreach Center, Little Rock, AK, March 1988.

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Arnos, K.S. & Downs, K. An introduction to genetics and deafness. Presentations to the faculty and staff of the California School for the Deaf, Fremont, CA, April 1988.

Arnos, K.S. & Downs, K. Genetics and deafness: Medical and cultural implications. Presentation to the Department of Genetics, University of California, Berkeley, CA, April 1988.

Arnos, K.S. & Israel, J. Genetics and hearing impairment: Medical and cultural implications. Workshop presented at the Gallaudet Regional Center, Flagler College, St. Augustine, FL, January 1988.

Arnos, K.S. (Fourth presenter), Bartley, L.L., Carpenter, N.J., & Ing, P.S. A model program for educating speech, hearing and language professionals. Poster presentation at the annual meeting of the Great Plains Genetics Service Network, Omaha, NE, April 1988.

Bloomquist, C.A. & Allen, T.E. Comparison of mathematics test item performance by hearing and hearing impaired students. Paper presented at the meeting of the American Educational Research Association, New Orleans, LA, April 1988.

Bloomquist, C.A. & Allen, T.E. Examining differential test item performance in mathematics computation and mathematics applications. Paper presented at a meeting of the American Educational Research Association, New Orleans, LA, April 1988.

Bloomquist, C.A. & Peyton, J.K. Learning style preferences of deaf students: Preliminary validity evidence. Paper presented at a meeting of the Teachers of English to Speakers of Other Languages, Chicago, IL, March 1988.

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Brauer, B.A. The Mental Health Research Program at Gallaudet University. Presentation to the Brazilian Group, International Center on Deafness, Gallaudet University, Washington, DC, September 1987.

Brauer, B.A. Depression in deaf post-secondary students: Diagnosis and treatment. Presentation at the National Training Institute for Mental Health Professionals, National Academy, New Orleans, LA, October 1987.

Brauer, B.A. Diagnostic issues in mental health and deafness. Presentation for the Gallaudet Research Institute/University of California Center on Deafness Seminar Series on Deafness and Mental Health, San Francisco, CA; Washington, DC, October 1987.

Brauer, B.A. Problems in the psychological assessment of the deaf. Panel presentation with Harlan Lane and Thomas Allen in the Powrie V. Doctor Chair Lecture Series, Gallaudet University, Washington, DC, April 1988.

Brauer, B.A. New developments in the psychological assessment of the deaf. Presentation for the Gallaudet Regional Center, Ohlone College, held at Washington State School for the Deaf, Vancouver, WA, May 1988.

Brauer, B.A. Workshop for the Stressed Therapist. Workshop conducted with Elliott Blum, Ph.D., Chief, Clinical Psychology Training Program, Saint Elizabeth's Hospital, Washington, DC. The National Training Institute for Mental Health Professionals, National Academy, New Orleans, LA, October 1987.

Brown, S.C. Recent advances in the demography of morbidity. Panel presentation at a meeting of the Southern Demographic Association, Atlanta, GA, October 1987.

Brown, S.C. Recent advances in the demography of disability. Poster session at a meeting of the Population Association of America, New Orleans, LA, April 1988.

Brown, S.C. Definitional issues in disablement and the International Classification of Impairments, Disabilities and Handicaps. Paper presented at a meeting of the Society for Disability Studies, Washington, DC, June 1988.

Day, P.S. Mother-infant interaction: Focus on hearing-impairment. Presentations at the School of Education, Western Maryland College, Westminster, MD and at the Maryland School for the Deaf, Columbia, MD, April 1988.

Day, P.S., Gutfreund, M., & Bodner-Johnson, B. Patterns of topic initiation and response. Presentation at the Conference of the Division of Early Childhood, Council for Exceptional Children, Denver, CO, November 1987.

Day, P.S., Gutfreund, M., & Bodner-Johnson, B. Reactions to infants' gaze aversion: Maternal directiveness and infant hearing status. Presentation at the Annual Convention of the American Speech-Language-Hearing Association, New Orleans, LA, November 1987.

Deyo, D. Integration, not fragmentation; Auditory skills and speechreading skills; Working parents; Parent forum; Materials selection and materials development; Teaming. Presentations at Santillan School Training Session, Quito, Ecuador, October, 1987.

Deyo, D. Implications of total communication for the audiologist; Integration, not fragmentation; Early intervention with deaf children; The transitional years: Deaf children from 10-15 years of age. Papers presented at the First National Seminar on Trends in the Education of Deaf Persons, Quito, Ecuador, October, 1987.

Downs, K. Genetics and deafness: Medical and cultural implications. Presentation at California State University, Fresno, CA, April 1988.

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Ewoldt, C. Literacy development of deaf children. Presentation at Brisbane College of Advanced Education, Mt. Gravatt Campus, Brisbane, Queensland, Australia, August 1987.

Ewoldt, C. Methods for improving literacy in hearing-impaired students. Presentation at the Special Education Resource Centre for the Hearing-Impaired, Brisbane, Queensland, Australia, August 1987.

Ewoldt, C. How young children begin to read; The influence of the home on literacy development; The reading and writing development of young deaf children; Reading development in elementary and secondary school programs; Mainstreaming of the hearing-impaired. Presentations at the Victoria College of Advanced Education, Burwood Campus, Melbourne, Victoria, Australia, August-September 1987.

Ewoldt, C. Literacy development of hearing-impaired children. Presentation at the Ewing School for the Deaf, Ballarat, Victoria, Australia, September 1987.

Ewoldt, C. How teachers read to young deaf children. Presentation at Van Asch College, Christchurch, New Zealand, September 1987.

Ewoldt, C. Creating a literacy environment for deaf children in the classroom. Presentation at the Kelston School for the Deaf, Auckland, New Zealand, September 1987.

Ewoldt, C. Reading and the hearing-impaired child. Paper presented at the Annual Conference on Programs for Exceptional Children, Paducah, KY, November 1987.

Ewoldt, C. The teacher's role in developing literacy. Presentation at the Kentucky School for the Deaf, Danville, KY, November 1987.

Ewoldt, C. Interactive language teaching; Reading: Assessment and teaching strategies. Presentations at a meeting of the Ontario Educators of the Hearing-Impaired, Milton, Ontario, Canada, November 1987.

Ewoldt, C. The development of literacy in young deaf children. Presentation at Clairlea Public School, Scarborough, Ontario, Canada, December 1987.

Ewoldt, C. Home and school factors which affect literacy development in young children. Presentation at the University of Arizona, Tuscon, AZ, March 1988.

Ewoldt, C. Practical applications of literacy research findings. Presentation at the University of Arizona, Tucson, AZ, March 1988.

Harkins, J.E. Rehabilitation engineering and technology in the vocational rehabilitation of deaf adults. Presentation at Region III Forum on Issues in the Vocational Rehabilitation of Deaf and Deaf-Blind Individuals, Philadelphia, PA, March 1988.

Harkins, J.E. Speech recognition for communication between deaf and hearing people. Paper presented at Speech-Tech '88, New York, NY, April 1988.

Harkins, J.E. The future of technology for deaf and hard of hearing people. Presentation at Technology Fair, New Rochelle, NY, June 1988.

Harkins, J.E. Lifestyles of the not-so-rich or famous: Focus group interviews for consulting with disabled consumers. Presentation at ICAART '88, Montreal, Quebec, Canada, June 1988.

Harkins, J.E. Future technology and issues for deaf-blind people. Presentation at the annual conference of the American Association of the Deaf-Blind, Baton Rouge, LA, June 1988.

Harkins, J.E. & Jensema C.J. Results of needs assessment on technology for deaf people. Presentation at the Convention of Telecommunications for the Deaf, Inc., Secaucus, NJ, July 1987.

Holden-Pitt, L.D., Revoile, S., Pickett, J.M., & Talkin, D. Perception of initial-fricative voicing: Impaired- and normal-hearing listeners. Paper presented at the Annual Convention of the American Speech-Language-Hearing Association, New Orleans, LA, November 1987.

Holt, J.A. The effects of academic integration on the mathematics and reading achievement of hearing impaired students. Presentation at the Gallaudet Research Institute Mainstreaming Roundtable, Washington, DC, April 1988.

Holt, J.A. Comparison of Mallows Cp statistic with other criteria for the selection of predictor variables in multiple regression. Annual meeting of the Society for Disability Studies, Washington, DC, June 1988.

Hotchkiss, D.R. Recent advances in the demography of morbidity. Organizer and Chair of symposium presented at the annual meeting of the Southern Demographic Association, Atlanta, GA, October 1987.

Hotchkiss, D.R. The effects of increased commercialization in traditional smallholder agriculture on health and nutritional status in Guatemala. Presentation at the annual meeting of the Population Association of America, New Orleans, LA, April 1988.

Hotchkiss, D.R. Current and future needs of the hearing impaired elderly population: What do the projections tell us? Presentation at the annual meeting of the Society for Disability Studies, Washington, DC, June 1988.

Israel, J. Genetics and hearing impairment. Presentation to the medical staff at the Hunt Place Public Health Clinic, Washington, DC, April 1988.

Israel, J. Genetics and deafness. Presentation for the Family Learning Vacation at the West Virginia School for the Deaf and the Blind, Romney, WV, June 1988.

Israel, J. & Cunningham, M. Genetics and deafness: Genetic counseling and cultural issues. Presentation for a Genetics course for health professionals, Georgetown University, Washington, DC, April 1988.

Jensema, C.J. Emergency vehicle detection: Systemic considerations. Presentation at ICAART '88, Montreal, Quebec, Canada, June 1988.

Jensema, C.J. & Harkins, J.E. How will I know when there's someone at the door? Alerting devices for hard of hearing people. Presentation at the meeting of Self-Help for Hard of Hearing People, Rochester, NY, June 1988.

Kluwin, T. Teaching writing as a process. Presentation at a meeting of the Southeast Texas Teachers of the Deaf, San Antonio, TX, October 1987.

Kluwin, T. Teaching writing as a process. Presentation at a meeting of Teachers of the Hearing Impaired of the Toronto Metro School District, Toronto, Canada, January 1988.

Lane, H. Is there a "psychology of the deaf?" Presentation in the Powrie V. Doctor Lecture Series, Gallaudet University, Washington, DC, February 1988.

Lane, H. Speech deterioration in deafened adults. Presentation in the Powrie V. Doctor Lecture Series, Gallaudet University, Washington, DC, March 1988.

Lane, H. Portraits in deaf history. Presentation in the Powrie V. Doctor Lecture Series, Gallaudet University, Washington, DC, April 1988.

Lane, H. Paternalism, deaf people and the Third World. Presentation in the Powrie V. Doctor Lecture Series, Gallaudet University, Washington, DC, May 1988.

MacTurk, R.H. Patterns of bidirectional interaction in 6-, 9-, and 12-month-old deaf and hearing infants. Poster presented at the Conference on Human Development, Charleston, SC, March 1988.

MacTurk, R.H. Patterns of synchronous interaction in deaf and hearing infants. Poster presented at the Sixth Biennial International Conference on Infant Studies, Washington, DC, April 1988.

MacTurk, R.H. Early social-emotional development in deaf and hearing infants. Presentation to the Department of Otolaryngology, Children's Hospital Medical Center and to the Auditory Evoked Response Laboratory, Massachusetts Eye and Ear Infirmary, Boston, MA, May 1988.

Mather, S. A writing strategy for translation for deaf children whose first language is American Sign Language. Panel presentation at Gallaudet Symposium on ASL Literacy and English. Gallaudet University, Washington, DC, May, 1988.

Meadow-Orlans, K.P. Psychiatric evaluation of pre-lingually deaf children: Parent-child interaction research. Presentation at the annual meeting of the American Academy of Child and Adolescent Psychiatry, Washington, DC, October 1987.

Meadow-Orlans, K.P. Interaction and support: Mothers and deaf infants. Presentation at the Atlanta Area School for the Deaf, Atlanta, GA, December 1987.

Meadow-Orlans, K.P. Linguistic implications of current research on interactions of deaf mothers and infants. Presentation to delegation from Moscow Institute of Defectology, Washington, DC, January 1988.

Meadow-Orlans, K.P. Research with mothers and deaf infants: Issues of stress and support. Lecture for Georgetown Hospital Developmental Assessment Center, Infant Development Training Program, Washington, DC, April 1988.

Meadow-Orlans, K.P. Research on mother-infant interaction. Presentation for the Gallaudet Research Institute/University of California Center on Deafness Seminar Series on Deafness and Mental Health, San Francisco, CA; Washington, DC, May 1988.

Meadow-Orlans, K.P., Erting, C.J., Day, P.S., MacTurk, R.H., Prezioso, C., & Gianino, A. Deaf and hearing mothers of deaf and hearing infants: Interaction in the first year of life. Presentation at the meeting of the X World Congress of the World Federation of the Deaf, Helsinki, Finland, July 1987.

Moores, D.F. Factors predictive of achievement in deaf adolescents. Presentation at a meeting of the Council of American Instructors of the Deaf, Santa Fe, NM, July 1987.

Moores, D.F. Research on deafness in the United States. Symposium Chair and Presenter at the Soviet-American International Research Exchange of Scholars, Washington, DC, January 1988.

Moores, D.F. Mainstreaming: Knee deep in the big muddy. Presentation at the Gallaudet Research Institute Mainstreaming Roundtable, Washington, DC, April, 1988.

Prezioso, C.T. Gallaudet research project on the interaction of deaf mothers and their infants. Presentation to the Education Research Unit, University of Bristol, Bristol, England, October 1987.

Prezioso, C.T. Support group for deaf parents. Presentation for the Gallaudet Research Institute/University of California Center on Deafness Seminar Series on Deafness and Mental Health, Washington, DC; San Francisco, May 1988.

Rawlings, B.W. Upward job mobility: The new direction and challenge. Presentation at the Third Biennial Regional Conference on Postsecondary Education for Hearing Impaired Persons, Knoxville, TN, April 1988.

Revoile, S. Speech-cue enhancement for the hearing impaired. Presentation in a mini-seminar: Hearing-aid Processed Speech, at the Annual Convention of the American Speech-Language-Hearing Association, New Orleans, LA, 1987.

Schildroth, A.N. Interpreting achievement test scores of deaf students. Paper presented at the Sixth Eastern Regional Conference of the International Reading Association, Hyannis, MA, August 1987.

Schildroth, A.N. Achievement testing of hearing impaired students. Workshop for staff of Onondaga, Cortland, Madison BOCES, Syracuse, NY, October 1987.

Schildroth, A.N. Demographics and communication of deaf children. Presentation at the annual meeting of the Maryland Speech-Language-Hearing Association, Baltimore, MD, April 1988.

Schildroth, A.N. The influence of "biased" test items on reading test performance. Presentation at the annual convention of the International Reading Association, Toronto, Ontario, Canada, May 1988.

Shaver, K.A. Genetics and hearing impairment. Workshop for the Speech and Hearing Association of Virginia, Charlottesville, VA, August 1987.

Shaver, K.A. Genetic causes of hearing impairment and the genetic counseling process. Presentation to the Parents of Hearing Impaired Children Support Group at a meeting of the Easter Seal Society of York County, York, PA, October 1987.

Shaver, K.A., Shaffer-Gordon, M.C., Cunningham, M.C., Toomey, K.E., Bodurtha, J.A., Proud, V.K., & Nance, W.E. A model program for the provision of genetic counseling for the deaf. Poster presentation at the annual meeting of the American Society of Human Genetics, San Diego, CA, October 1987.

Starke, M.C. Variation in occupational status among former college students who are deaf. Poster presentation at the annual meeting of the Society for Disability Studies, Washington, DC, June 1988.

Trychin, S. Coping strategies for hard of hearing people and their families. One-week intensive workshop at the Gallaudet Regional Center, Ohlone College, Fremont, CA, July 1987.

Trychin, S. Coping strategies for hard of hearing people and their families. One-week intensive workshop at Johnson State College, Johnson, VT, August 1987.

Trychin, S. Hearing impairment and aging: Psycho-social aspects. Presentation and one-day workshop for the Charles County Department of Aging, LaPlata, MD, September 1987.

Trychin, S. Hearing loss and aging. Presentation at the Arnold Senior Center, Arnold, MD, September 1987.

Trychin, S. Coping strategies for hard of hearing people and their families. Presentation at a meeting of The Washington and Oregon Speech and Hearing Association, Seattle, WA, October 1987.

Trychin, S. Hearing impairment and aging: Psycho-social aspects. Presentation and one-day workshop at the Eugene Speech and Hearing Center, Eugene, OR, December 1987.

Trychin, S. Coping with hearing loss. Presentation at a meeting of the Easter Seal Society of York County, York, PA, January 1988.

Trychin, S. Coping strategies for hard of hearing people and their families. Presentation at the University of Maryland, College Park, MD, February 1988.

Trychin, S. Coping strategies for hard of hearing people and their families. Presentation at the Kapiolani Community College, Honolulu, HI, April 1988.

Trychin, S. Living with hearing loss: Coping and stress management. Presentation at the Conference on Hearing in an Aging Society, Rochester, NY, June 1988.

Trychin, S. Coping with hearing loss. Presentation at a meeting of Self Help for Hard of Hearing People, Rochester, NY, June 1988.

Vestberg, P. Deaf personality: Myths and reality. Visiting Scholar presentation sponsored by the Gallaudet Research Institute, Gallaudet University, Washington, DC, June 1988.

Wolff, A.B. (Third presenter), Kammerer, B.L., & Gardner, J.K. Rey-Osterrieth complex figure drawings of deaf children with different etiologies of deafness. Paper presented at the meeting of the International Neuropsychological Society, New Orleans, LA, January 1988.

Woodward, J.C. Black Southern signing and the oral history of Black deaf persons. Presentation at the Black Deaf Advocates Sixth Annual Convention, Cleveland, OH, August 1987.

Woodward, J.C. Deaf parents--hearing children: International perspectives. Presentation at the first national CODA conference, Santa Barbara, CA, September 1987.

Woodward, J.C. Teachers' communication in the classroom: A summary of recent research. Presentation at the Texas School for the Deaf, Austin, TX, October 1987.

Woodward, J.C. Sign languages and deaf cultures: Cross-cultural perspectives. Presentation at the University of Kentucky Linguistics Circle, Lexington, KY, November 1987.

Woodward, J.C. U.S. deaf culture: Anthropological and sociological perspectives. Presentation at the University of Delaware, Wilmington, DE, May 1988.

# Affiliated Researchers

*(External Collaborators and Small Grant Recipients)*

# 1987-88 External Collaborators

*The Gallaudet Research Institute collaborates extensively with researchers and organizations outside of Gallaudet University, both in and out of the field of deafness. The following is a list of these collaborators, their affiliations, and the Gallaudet Research Institute project to which they contributed their expertise.*

---

**David Adams**, daTech Center for Data Control (Current and Future Needs of the Hearing Impaired Elderly)James M. Pickett, Professor

**Lauren Adamson**, Georgia State University (Interaction and Support: Mothers and Deaf Infants)

**Susan Ahmed**, Georgetown University (Aging and the Interaction of Demography and Hearing Loss)

**Jean Andrews**, Eastern Kentucky University (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Roger Bakeman**, Georgia State University (Interaction and Support: Mothers and Deaf Infants)

**Aaron Beck**, University of Pennsylvania (Translation of Psychological Instruments into American Sign Language: An Introduction)

**Jared Bernstein**, SRI International (Technology for Sensory Devices for Deaf Severely Hard of Hearing People)

**Susan Black**, Medical College of Virginia (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population)

**Joann N. Bodurtha**, Medical College of Virginia (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population and Genetic Epidemiology of Diabetes in Rubella Deafness)

**Mary Chamie**, United Nations Statistical Office (Global Advances in the Demography of Disability)

**Eve Chevron**, Yale University (Training in the Interpersonal Psychotherapy Approach to Depression)

**Jeffrey Cohn**, University of Pittsburgh (Interaction and Support: Mothers and Deaf Infants and Parent-Infant Interaction)

**Dean Cunningham**, Texas Education Agency (Texas State Survey of Hearing Impaired Children and Youth)

**Gary Curtis**, Texas Education Agency (Texas State Survey of Hearing Impaired Children and Youth)

**W. Grant Dahlstrom**, St. Elizabeths Hospital (Personality Profile of Deaf College Students Using the ASL-Version of the MMPI, Prevalence of Psychological Disorders: Validation of ASL-Version Psychological Tests, and Translation of Psychological Instruments into American Sign Language: An Introduction)

**James J. DeCaro**, National Technical Institute for the Deaf (Studies in Postsecondary Education)

**Irene Elkin**, National Institute of Mental Health (NIMH) (Training in the Interpersonal Psychotherapy Approach to Depression)

**Vicki Everhart**, University of Texas (Dallas) (Interaction and Support: Mothers and Deaf Infants)

**Jonathan Fay**, St. Elizabeths Hospital (Personality Profile of Deaf College Students Using the ASL-Version of the MMPI and Translation of Psychological Instruments into American Sign Language: An Introduction)

**Mary E. Fowles**, Educational Testing Service (A Comparative Study of Different Methods for Assessing the Writing Abilities of Hearing Impaired College Students and Factors Predictive of Academic Achievement in Deaf Adolescents)

**Judith K. Gardner**, Boston Childrens Hospital and Harvard Medical School (Neurobehavioral Project)

**Charles Gelso**, University of Maryland (Prevalence of Psychological Disorders: Validation of ASL-Version Psychological Tests)

**Andrew Gianino**, University of Massachusetts (Beltone Scholar) (Parent-Infant Interaction)

**Martha Gonter-Gaustad**, Bowling Green State University (Longitudinal Study of Three Cohorts of Hearing Impaired Students in Public High School Programs)

**Wendy Goodhart**, Pennsylvania School for the Deaf (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Mary Gutfreund**, University of Bristol, England (Parent-Infant Interaction)

**Freida Hammermeister**, University of Pittsburgh (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Robert Hoffmeister**, Boston University (Factors Predictive of Academic Achievement in Deaf Adolescents)

**Betsy L. Kammerer**, Boston Childrens Hospital and Harvard Medical School (Neurobehavioral Project)

**Suzanne King**, Douglas Hospital Research Center, Quebec City, Canada (Longitudinal Study of Three Cohorts of Hearing Impaired Students in Public High School Programs)

**Mary Beth Lartz**, University of Illinois (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Amy Lederberg**, University of Texas (Dallas) (Interaction and Support: Mothers and Deaf Infants)

**Harry Levitt**, City University of New York (Technology for Sensory Devices for Deaf Severely Hard of Hearing People)

**Lorraine McCune**, Rutgers University (Symbolic Play Behaviors of Hearing Impaired Toddlers: A Pilot Study)

**Cynthia McIntyre**, University of Texas (Dallas) (Interaction and Support: Mothers and Deaf Infants)

**Mary McNorton**, University of Texas (Dallas) (Interaction and Support: Mothers and Deaf Infants)

**James G. Martin**, Department of Psychology, University of Maryland (Speech Enhancement Based on Articulatory Properties)

**George Menot**, CompuServe, Inc. (An Informal Investigation into the Use of CompuServe by Deaf People)

**Etta Miller**, Texas Christian University (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Morton Nadler**, Virginia Polytechnic Institute (Technology for Sensory Devices for Deaf Severely Hard of Hearing People)

**Walter E. Nance**, Medical College of Virginia (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population and Genetic Epidemiology of Diabetes in Rubella Deafness)

**Karen Nelson**, University of Massachusetts (Amherst) (Interaction and Support: Mothers and Deaf Infants)

**James M. Pickett**, Professor Emeritus, Gallaudet University (Perception of Complex Auditory Stimuli by the Deaf and Speech Enhancement Based on Articulatory Properties)

**Sally Popper**, University of Pittsburgh (Interaction and Support: Mothers and Deaf Infants)

**Marjorie Ragosta**, Educational Testing Service (Investigating the Use of the TOEFL Test of Written English with Gallaudet Students)

**Kenneth N. Rosenbaum**, Children's Hospital National Medical Center (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population)

**Shelly Ross**, University of Pittsburgh (Interaction and Support: Mothers and Deaf Infants)

**Jeffrey Rubin**, Bureau of Economic Research, Rutgers University (Technology for Sensory Devices for Deaf Severely Hard of Hearing People)

**Harvey Ryland**, Tampa, Florida (Technology for Sensory Devices for Deaf Severely Hard of Hearing)

**Howard Saal**, Children's Hospital National Medical Center (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population)

**Paula Scott**, Texas Women's University (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Diane Slocumb**, Georgia State University (Interaction and Support: Mothers and Deaf Infants)

**Alfred Sonnenstrahl**, Telecommunications for the Deaf, Inc. (Technology for Sensory Devices for Deaf Severely Hard of Hearing People)

**Harvey Stern**, Children's Hospital National Medical Center (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population)

**Michael Stinson**, NTID (Longitudinal Study of Three Cohorts of Hearing Impaired Students in Public High School Programs)

**Jill Stoeffen-Fisher**, University of Nebraska (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Nancy Taylor**, The Catholic University of America (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Irene Terrero**, Ministry of Education Caracas, Venezuela (Venezuelan Survey, 1986-87)

**Robert W. Thatcher**, University of Maryland Eastern Shore and University of Maryland School of Medicine (Neurobehavioral Project)

**Kathleen E. Toomey**, St. Christopher's Hospital for Children (Demonstration of an Innovative Approach to Genetic Counseling for the Deaf Population)

**Edward Tronick**, University of Massachusetts (Amherst) (Interaction and Support: Mothers and Deaf Infants and Parent-Infant Interaction)

**Roberta Truax**, University of Cincinnati (A Longitudinal Study of Developing Literacy in Three- to Eight-Year-Old Hearing Impaired Children)

**Herbert J. Walberg**, University of Illinois at Chicago (Furthe Study of Hearing Impaired Students' Achievement through the Use of the Use of the Center for Assessment and Demographic Studies' 1983 Stanford Achievement Test Data Base)

**Mark Weiss**, City University of New York (Technology for Sensory Devices for Deaf Severely Hard of Hearing People)

# 1987-88 Small Grant Award Recipients

*Each year the Gallaudet Research Institute awards competitive grants of up to $2000 to Gallaudet faculty, staff, and students to pursue a wide range of research efforts. The following is a list of the grant recipients, their departments, and the title of the study for which they received GRI support.*

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**Anne M. Butler**, Department of History, "Roman Catholic Nuns on the American Frontier."

**Kenneth J. Campbell**, Department of Economics, "A Study of the Effect of John McCone Upon the CIA."

**John Christiansen, Sharon Barnartt, Richard Meisegeier**, and **Barbara White**, Department of Sociology and Social Work, "A Sociological Study of the Gallaudet Protest of 1988."

**Robert E. Johnson**, Department of Linguistics; **Jane Norma**, TV, Film and Photography, "Mayan Sign Language."

**Harriet Kaplan**, Department of Audiology, "A Communication Self Assessment Scale for Deaf Adults and Adolescents."

**Vicki Kemp**, Department of Mathematics and Computer Sciences, "The Van Hiele Levels of Geometric Thought and Achievement in Eculidean Geometry Among Deaf Undergraduate Students."

**Ruth Morgan**, Department of Linguistics, "Pilot Study to Investigate South African Sign Language."

**Mary June Moseley**, Department of Audiology and Speech-Language Pathology, "Pragmatic Abilities for Hearing Impaired Individuals."

**Sue Pressman, Jon Hackbarth**, and **Geoff Mathay**, Career Center, "Evaluation of Two Value Assessment Instruments to Determine Appropriateness Use with College-Level Students."

**Kurt Schneidmiller**, Office of Institutional Research, Planning and Evaluation, "The Decision to Institutionalize or Terminate Professional Development Programs at Three Universities."

**John Schuchman**, Department of History; **Donna Wells**, Gallaudet University Library-Archives, "Finding Aids and Videotaped Oral History."

**John Van Cleve**, Department of History, "Social Thought of A.G. Bell."

**Donna Wells**, Gallaudet University Library-Archives, "The History of Deaf Women at Gallaudet."

**Robert L. Williams** and **Raymond J. Folven**, Department of Psychology, "Early Memories in Deaf Secondary School Students."

**Elizabeth A. Winston**, Department of Linguistics, "Transliterating and English--What's the Message?"

# 1987/88 Graduate Studies and Research Personnel

# 1987-88 Graduate Studies and Research Personnel

**Thomas E. Allen**
Director, Center for Assessment and Demographic Studies and Associate Professor, Department of Educational Foundations and Research
A.B., Kenyon College; Ph.D., University of Minnesota (Educational Psychology).

**Kathleen Shaver Arnos**
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